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# THE SCOTTISH GEOGRAPHICAL MAGAZINE

# THE SCOTTISH GEOGRAPHICAL MAGAZINE

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# THE SCOTTISH GEOGRAPHICAL MAGAZINE.

## ANNIVERSARY ADDRESS.

### AFRICA: BRITISH AND OTHER SPHERES OF INFLUENCE.

By General Sir Lewis Pelly, K.C.B., K.C.S.I., M.P.

*Director of the British East Africa Company.*

(*Read at Meetings of the Society in Edinburgh and Glasgow, November* 1889.)

When the Royal Scottish Geographical Society recently did me the honour of inviting me to give their Anniversary Address, my first impulse was to express gratification at their generous thought, but respectfully to decline an office for which I felt myself to be in many respects ill qualified. When, however, I was reminded that the subject selected by your Council was that of Africa, and that the accidents of my service under Government had brought me into many direct and indirect relations with the East Coast of that continent, I reflected that, although I had no pretensions to figure as a geographer before so cultivated and scientific an audience as that which I should have to encounter in the great centres of Scottish life, yet I might perhaps be able to put together some facts bearing on the present position of British interests in Africa, which, being in the nature of geography applied to practical purposes, would present an *ensemble* such as might enable students to correlate and lend some semblance of unity to the variety of disconnected African allusions and narratives with which the press at the present time daily teems. Nor was I quite without hope that remarks published from this hall might prove of some practical utility to those earnest workers, philanthropic societies, and politico-commercial companies who are expending such vast sums of money and such strenuous endeavours with the object of spreading light, liberty, civilisation, and Christianity among the hitherto suffering descendants of Ham.

The able address delivered before this Society last year by Sir W. W. Hunter dealt with the historical geography of the immense peninsula lying on the further side of the Indian Ocean. This evening we deal with the hithermost side of the Indian Ocean, and view the dawn of freedom touching the eastern shores of the Dark Continent, and more and more lighting the highlands of the interior. We regard Africa as only just now awakening to life, much as our ancestors of 300 years ago may have regarded what is now America; and yet no history is more ancient than that of Africa, nor are glimpses wanting of its movements at intervals down through the ages. It were waste of time to dwell on ancient Egypt before an audience that has the Sacred Scriptures by heart. The old civilisations of Carthage are pictured for us in history, from Polybius to Gibbon. We see Hannibal, the greatest cavalry general that ever lived, embarking from the African coast, and conducting fifteen campaigns in Europe without any base of operations; we see the war-craft of Rome and Carthage plying on the waters of the Mediterranean, and meditate that, with our present appliances of electricity, steam, and military science, one battle-ship could have maintained communications between Egypt and the Pillars of Hercules, and swept the sea of all enemies, with as little damage to herself as a British cruiser now receives when she sinks the slave-dhows from Mozambique to the Persian Gulf.

Again, we catch a glimpse of Julius Cæsar, fascinated in listening to a tale of the Nile, and declaring himself ready to quit for a time the Imperial Government of Rome, in order to trace out the sources of that mysterious river,—discoveries, however, reserved for Speke, Grant, and Stanley.

Onwards in the seventh century, we find wild Arabs, inspired by religious fervour, carrying the sword and the Koran along the North Coast of Africa from Egypt to Ceuta, and spreading southward into North-Eastern and Central Africa. This movement of Islam still continues, and may yet cause us trouble, unless the Powers of Europe interested in African civilisation shall unite to eradicate slavery and fanaticism by means of steam, telegraph, and the normal appliances of European governments.

Again, in 1415, we find Prince Henry and the Portuguese navigators taking Ceuta, and gradually working southward, until in 1484 they are at the Equator. In that year Diego Cam and Martin Bhaim discovered the Congo mouth, and coasted southward, till, in 1486, Bartholomew Diaz sailed round the southernmost point of Africa without sighting it, and, wending homeward from Algoa Bay, accidentally discovered the Cape of Good Hope. In 1497-98, Vasco da Gama touched at the East Coast, and leaving Africa at the Port of Malindi, crossed the Indian Ocean to Calicut in the Indies; to the end that, within twenty years from that date, the entire East Coast of Africa, of the Red Sea, the Persian Gulf, Western India, and so eastward through the Straits of Malacca, to the Eastern Archipelago, had been mapped, and forts or trading stations established at convenient intervals. I notice among your intending Lecturers for this Session, the name of Mr. H. J. Mackinder, and I can

imagine few essays more fascinating than one which a man of his accurate geographical knowledge and singular powers of memory might compose on the Portuguese navigators of the fifteenth and sixteenth centuries. The Portuguese forts still remain as marvellous monuments of their builders' daring, organisation, and enterprise. But the energies which produced them seem to have withered or ceased. They ceased, indeed, when the empire of Portugal ceased; and her empire ceased when the kingdom of Portugal fell under a foreign power.

About 200 years ago England, France, and Holland, commenced their settlements on the West African Coast; but our stations were neglected, and have since been circumvented from the interior by French or other foreign influences. The Dutch seem wholly to have retired from the scene.

We come now to the present century, when—that is to say, about fifty years ago—France commenced her Algerian conquest, and the practical extension of her territories southward in the Senegal and on the Gaboon coast.

During the present century also a series of adventurous explorers, British as well as foreign, have made expeditions from the North, the South, the West, and the East Coasts. But as this paper is mainly concerned with British enterprise, I am not able, as I should otherwise earnestly desire, to pay an adequate tribute to the exertions and genius of the numerous foreign explorers. I may, however, be permitted briefly to recall, among recent explorers, the name of Dr. Junker, a Russian, who spent many years up to the end of 1886 exploring, among other districts, the Wellé-Makua basin. Schweinfurth's *Heart of Africa* is, of course, one of the great African classics, being the leading authority for that vast region which he explored to the west of the Albert Nyanza. Nachtigal's name is intimately associated with Lake Tsad and the Central Sudan. In the Congo basin, and beyond, Wissmann, Pogge, Wolf, and many other German explorers have done excellent work, Wissmann having twice crossed the continent of Africa. Of French explorers, the name of De Brazza in the Ogowé region may be specially mentioned, though in the same district as far west as the Congo, and also in Senegambia, there have been several French travellers of note. The Portuguese travellers, Serpa Pinto, Capello, and Ivens have added considerably to our knowledge of the wide region lying between Angola and the East Coast. In like manner many Italian travellers have penetrated into Abyssinia and the Galla country.

Among British explorers I may refer on the North Coast to Clapperton, Richardson, Sir Joseph Hooker, and Joseph Thomson. For the West Coast I would name Mungo Park, Clapperton, Denham, the brothers Lander, Laing, Laird, Baikie, Thomson, Burton, and Johnston. But in respect of expeditions from the East Coast I may be allowed to be somewhat less restrictive, as it is with this littoral and with its interior high-level lake systems that the recent developments of the interests of Great Britain have been mainly concerned. And I am extremely indebted to the Librarian of the Royal Geographical Society of London, Mr. Scott Keltie, for the generosity with which he has placed his own

articles and papers on this and many other African matters at my disposal.

First, then, I would allude to Livingstone's Zambesi Expedition, from 1858 to 1864. Livingstone, the greatest missionary-explorer, included in this expedition the examination of the mouths of the Zambesi and Rovuma rivers, as well as a careful survey of much of the main river and of Lake Nyassa and the region around it. Livingstone's successors in these parts have been Dr. Stewart, who constructed a road between Lakes Nyassa and Tanganyika, and thoroughly surveyed Nyassa; Mr. O'Neill, Mr. Joseph Thomson, and others. In 1857, Burton and Speke independently discovered Lake Tanganyika, whilst Speke further discovered the Victoria Nyanza, and commenced the solution of the great problem of the Nile. In 1860 and subsequent years, Speke and Grant traced the source of the Nile, or, at least, of the Victoria Nile, to the Victoria Nyanza; and we now await with intense interest the arrival of Stanley with news of the discovery of its south-western source in a lake —the Muta Nzige, previously discovered by him—to which he has given the name of Albert Edward. Livingstone, between the years 1866 and 1873, further added to our knowledge of the hydrography of the region lying between two and twelve degrees of south latitude. In 1874 Cameron in his journey across the continent supplemented this knowledge, while Thomson in 1880 filled in many details in the Central Lake Region.

Meantime, numerous German, British, and other missionaries reared stations, or explored inland from the East Coast to the high-level lakes. Mr. New, in 1871, ascended Kilima-njaro to the limit of the snow-line; and in that, or in previous years, pierced the Galla country, and collected much information concerning the snow-clad Mount Kenia and the Masai country. In 1884 and 1885, Thomson visited the region of Taveta, and crossing the Masai country for the first time, reached the lakes Naivasha and Baringo, touching the northern end of Victoria Nyanza. Mr. Stanley went to Uganda in 1875-6, and roused the ardour of many British missionaries to visit that country. Let me name among them Felkin, Wilson, Mackay, and Ashe.

We now come to the occupation of that portion of East Africa which lies between the Indian Ocean on the east, Kilima-njaro and Victoria Nyanza on the west, and Kenia, the Galla and Somali countries on the north. In regard to recent movements within this sphere, I am indebted to Mr. M'Dermott, of the East Africa Company's Office, for much condensed information. This is a region which is now defined and acknowledged as being a sphere of British influence. It extends from the Umba River in the south, northward to the ports and along the coast-line of Mombasa, Malindi, Kipini, Lamu, Manda, and other islands, and so still northwards, including the ports of Kismayu, Brava, Merka, Makdishu, with arrondissements of ten square miles, and Warsheikh, with an arrondissement of five square miles. In the first instance, this length of coast, with a depth of ten miles inland, from Umba to Kipini, inclusive, was conceded by the late Sultan of Zanzibar to Mr. (now Sir) William Mackinnon, or to him and his co-concessionnaires. A

delimitation of spheres of influence was agreed upon between Germany and Great Britain on the 26th October 1886; and last year the British Government conferred a royal charter on the Imperial British East Africa Company, granting to it all requisite governmental powers, not only within the ten-mile zone, but also authority to make treaties with the chiefs inland, and to extend the British Protectorate westward and north-westward, having a line of delimitation with the German sphere of influence to the southward, and stretching westward and north-westward across the Victoria Nyanza to Uganda; also through the Kavirondo country to Lake Baringo, and so round to the northward of Mount Kenia, and of the Tana River to the sea-board. This original concession has more recently received an extension by the grants aforementioned of Lamu, Manda, and the northern ports up to Warsheikh; while the Company have concluded and are concluding treaties inland with the chiefs between the Tana and the Juba Rivers.

The British East Africa Company obtained its charter on the third of September last year, and almost within one month of its incorporation its first administrator and officials were at Mombasa. Within two months more the first caravan of exploration had started into the interior, to found stations, establish relations with the various tribes and chiefs, open up routes, and acquire a closer knowledge of the country than the journeys hitherto recorded were able to afford.

The objective point of this particular expedition was the district from Lake Baringo to the northern shore of Victoria Nyanza. As far back as the month of April last, Mr. F. J. Jackson, accompanied by Mr. Ernest Gedge and Dr. A. D. Mackinnon, reached Machakos, on the borders of the Kikuyu country, and established there a permanent station of the Company. Starting from Gulu-Gulu, the first of the Company's stations (about 40 miles inland from Mombasa), Mr. Jackson's caravan proceeded by Teita and Ulu, carefully observing the characteristics of each district, and its advantages or disadvantages in respect of the supply of water and food, and the character of the inhabitants. Such observations in themselves are full of value, and the deliberation which they required, as well as the general and friendly intercourse with the people attending them, have invested the first advances of civilisation in those regions with that peaceful interest which promises well for permanent success. Machakos is situated about 7000 feet above the sea-level, on the great inland plateau which comprises so considerable a part of the British Company's territory. Mr. Joseph Thomson's return route took the way of Machakos, which lies to the east of Ngongo a Bagas; but Mr. Jackson and Mr. Gedge have in their onward movement left Ngongo on their left, and struck through the hitherto unattempted Kikuyu region on their way to Naivasha, Baringo, and Kavirondo, on the shores of the Victoria Nyanza. These gentlemen must, ere this, have explored a considerable extent of the remaining part of their task, and have probably reached Baringo, if not come in sight of Victoria Nyanza itself.

Mr. Bateman, another of the Company's officers, has recently conducted a caravan with stores for the Machakos depôt, and is now in charge of that station; and this officer's reports, together with those of

his predecessors on the same route, give one a familiarity with the region which contrasts most strikingly with the vague conceptions we had a year ago. Mr. Thomson, it will be remembered, was too ill on his rapid return through this territory to be able to use his powers of observation as on his outward journey. The most gratifying feature of the active explorations of the British East Africa Company's officers is found in the peacefulness of their progress and the goodwill which they have everywhere succeeded in winning from the natives by their method of dealing with the various chiefs and tribes.

Another caravan, attended with valuable results both to geographical knowledge and to civilisation, was despatched from the coast last spring, under the leadership of Mr. J. R. W. Pigott. The greater part of Mr. Pigott's route was through districts which had previously been untraversed by any white man, and the report of his journey is full of interest. Starting from the seaport of Malindi, he proceeded to the Tana River, at Golbanti, and up the right bank of the river to Masa, where he made treaties with the chiefs, and was assured by the old men that he was the first white man who had ever visited them. At this point Mr. Pigott crossed to the left bank of the Tana, making treaties and establishing friendly relations with the chiefs and people as far as the neighbourhood of Mount Kenia. Mr. Pigott found the river navigable to a distance of, roughly speaking, 250 miles from its mouth, with abundance of fuel on its banks. He left the Company's flag flying in those remote regions, and returned to the port of Mombasa by Ulu and the Sabaki River; and, in regard to the course of this last-named river and that of the Tana, he has noted results of great interest to geographers. The Tana he found to flow almost due east from Mount Kenia; and, travelling westward on its left bank, he discovered two rivers flowing into it from the north, above the point (Boza) which he fixes as the limit of navigation.

This first year's progress in opening the interior to civilising influences, with a staff merely initial, and a base of operations limited to a line of coast about 150 miles long, promises large and rapid results now that the Company's sea-base has been extended some hundred of miles further to the north, and that the Company is stretching itself to a more comprehensive grasp of its great work. Westward the extension of British influence is free to the confines of the Congo Independent State beyond the Albert Nyanza, and northwards. It is the hope of civilisation that it will meet the movement of "light and liberty" from the opposite direction in the Bahr-el-Ghazal or at Khartum. Temporary checks need not dishearten philanthropy when the movement of a great destiny is in steady progress—slow, it may be, at times, but accumulating in its course immense volumes of salutary energy.

But the operations of the East Africa Company have not been limited to the framing of treaties, determining stations, and exploring unknown regions inland: on the contrary, much has been done during the few months of its existence in a practical direction at Mombasa and elsewhere on the sea-coast. The port of Mombasa itself is being improved by the construction of a pier, a light-house, a short line of rail, and other

ordinary appliances of civilisation; the first strand of a railway (about forty miles in length), intended to connect the port of Mombasa with Lake Victoria Nyanza, is being sent out from England; the coast line from Mombasa to Kipini is being connected by telegraph and road; arrangements have been completed under which Mombasa is connected with the sea cable of Sir John Pender's Company, and thus placed in direct communication with London, Aden, and Bombay. One or two small coasting steamers have been ordered for feeding commerce; a shallow steam craft will ply on the river Tana, while the British India Steam Navigation Company will run a four-weekly line of swift mail steamers between London, Mombasa, and other ports; caravans will continue to traverse the interior in all directions, surveying the country, establishing convenient stations, prosecuting friendly intercourse with the tribes, and examining by experts the mineralogical features of the higher lands. Doubtless when Mr. Stanley reaches the East Coast, some two weeks hence, that incomparable traveller will bring with him fruitful and practical results of his marvellous journeys from the Aruwimi, the Albert Nyanza, the Albert Edward Nyanza, and from the several lands through which he has passed in reaching the southern shore of the Victoria Nyanza, and which were so modestly enumerated in a telegram recently given to the press by the Emin Pasha Relief Committee, which had long ago collected stores to await Stanley's arrival at Mslala, south of the Victoria, from which point he will reach the coast, *viâ* Mpwapwa, by the ordinary caravan route to Bagamoyo or Dar-es-Salaam. Stanley's selection of route is probably determined in some degree by the circumstances of his companions; for it appears from his latest communication that he has with him not only Emin Pasha and his lieutenants, but also some 400 Egyptians of various colours and classes, many among whom are sick. However, let us patiently wait till we see the great traveller arrive, as he doubtless will, in safety on the coast, having accomplished the task of relieving Emin Pasha not only from military embarrassments, but from mutiny, imprisonment, and probably from a fate similar to that of poor Gordon. Happily, Stanley was not too late! And it ought to be added that the Emin Relief Expedition owes its existence to the efforts of Sir W. Mackinnon, who originated it and formed a Relief Committee—whose efforts have been so gratefully acknowledged by Emin Pasha.

And now, before remarking on one or two other African regions which have been placed under British protection, permit me for a moment to turn aside in order to pay unaffected homage to the characters and genius of three men who in their several spheres have merited and will undoubtedly receive from African history the meed of their philanthropic, single-minded, indomitable endeavours.

I believe that it was about 1874 that Mr. Mackinnon began practically to interest himself in connection with the development of the idea of assisting to uproot the slave-trade, and to introduce civilisation into East Africa. One of his earlier attempts was the construction, in association with Sir Fowell Buxton, the late Mr. James Young, and Mr. James Stevenson, of a road towards the interior from the then recently established

port of Dar-es-Salaam, almost immediately opposite to the island of Zanzibar. Mr. Mackinnon's road extended some seventy miles inland, cost several thousand pounds sterling, and has now passed into the hands of the Germans, without as yet any compensation to the constructors. The ulterior desire of these gentlemen was to complete a road all along the sea-board of the Zanzibar dominions, and also roads running inland on the south to Lake Nyassa, and on the north to Victoria Nyanza, with roads between the great lakes, so as to connect all with the coast, and render practicable a scheme for preventing the passage of slave gangs within those limits. Mr. Mackinnon had got into relations with the then Sultan of Zanzibar, Said Bargash, and in 1877-78 received from His Highness a concession empowering him, or a company to be formed by him, to collect, during seventy years, the customs, and virtually to manage all the islands and continental ports on the sea-board of His Highness's dominions, and to exercise all his sovereign rights in the continent of Africa. And had the concession come into practical operation, the entire sea-board of East Africa, from Warsheikh and Makdishu on the north, to Cape Delgado on the south, would have come under British influence and control, and all the difficulties and complications which have subsequently arisen in that region would have been avoided. However, for various reasons, the quarter of a million sterling which had been subscribed for the project was not called up, and the concession fell through.

Meantime, His Majesty the present King of the Belgians, actuated solely by a desire to mitigate the sufferings of Africans, projected a trans-continental line of communications, which should leave the East Coast at Bagamoyo, or a point adjacent, and, crossing the African continent, should debouch at some point in the region of the Congo. In prosecuting this beneficent project, His Majesty organised a considerable staff, and erected numerous solid buildings at successive stations. About that time, however, Mr. Stanley accomplished his first marvellous journey across Africa, from east to west, debouching on the line of the Congo River. Subsequently, Mr. Stanley came into communication with the King of the Belgians, and His Majesty arranged for his return to the Congo, and for his well-known exploration of that then mysterious stream. Meantime, Mr. Mackinnon, through the good offices of our late revered friend, Sir Bartle Frere, had the honour of being presented to the King of the Belgians, who graciously encouraged him to indicate his views regarding African matters, and the various possible means of proceeding. After the Brussels Geographical Congress of 1876, His Majesty originated, organised, and from his private purse defrayed the expenses of, various expeditions in Central and Eastern Africa, which under the perseverant and wise guidance of His Majesty have gradually developed into the Congo Independent State,—a state thirty-three times the size of Belgium,—administered in a civilised manner, and having on all its frontiers territories possessing the conditions requisite for extensive and increasing commercial relations. It was complimentary to our countrymen that the King of the Belgians selected from among them some of his earliest administrators, among

others, Sir Frederick Goldsmid and Sir Francis de Winton, and the late General Gordon, who, however, was not spared to undertake the work. The Congo State has now the framework of a civilised African power, and promises great things in the future.

Whilst all this was developing in the Congo basin, matters on the East Coast lay dormant, until Germany, suddenly awakening to colonial aspirations, startled the African echoes by her descent on Angra Pequeña, and by the action she took on certain documents brought home by Dr. Peters. Finally, Germany began to move on the East Coast, came to her agreement with Great Britain concerning the continental dominions of Zanzibar, and secured to His Highness the Sultan his insular possessions.

Of the regions thus brought directly under British influence, the earliest does not date back much further than one year, and it is, perhaps, needless to remind you that in the sphere thus brought under our administration the moving spirit throughout has been your countryman, and a Vice-President of this Society, Sir William Mackinnon. His organising and far-seeing mind conceived the idea, developed the concession, raised as a foundation-stone among his personal friends the sum of one-quarter of a million sterling, moulded the charter on the lines of the old East India Company's Charter, surmounted official obstructions, appointed as provisional administrator a judicious and able man, Mr. George Mackenzie; and, happy in the support of Colonel C. Euan-Smith, Her Majesty's Political Agent and Consul-General at Zanzibar, and of the Colonel's *locum tenens*, Mr. Portal, has achieved within a twelvemonth results which may fairly be considered more than creditable, especially if it be borne in mind that this British Company has received from Her Majesty's Government neither subsidy nor material support of any kind, while the German Company has enjoyed unstinted Imperial support, whether in finances, men, officers, or munitions.

I return to my brief notice of British spheres of influence. Stanley has now discovered that Lake Victoria Nyanza stretches far away to the south-west of what was supposed to be its southern limit. It reaches, as discovered by Stanley, to within 155 miles of Tanganyika; it is itself 270 miles long, and covers an area of 27,000 square miles. Moving southward from the inland point of the East Africa Company's southern limit, we pass along the Lake Tanganyika, and arrive at the region so beneficially developed by the African Lakes Company, which was originally organised as a lay section of the missionary societies whose agents were settled on Lakes Nyassa and Tanganyika. This Company, however, under the guidance of some disinterested Scottish merchants, though enjoying no charter at all, has pushed British trade and interests, and has supported British missions over all that area which is sacred to the name of Livingstone. The company was formed in 1878, and has succeeded in developing the regions of East Central Africa between the Zambesi River and the Tanganyika Lake. It constructed a practicable road between Lakes Nyassa and Tanganyika, another road round the rapids of the Shiré River, and it launched steamers on the waters of the Nyassa. The influence of the company has been wholly for the good:

giving employment to natives, excluding spirits and fire-arms, strengthening the hands of the missionaries, and tending to check inter-tribal strife and the slave-trade. It is possible that this excellent little company may now be merged in the larger Association to which the British Government have within the past few weeks granted a charter under the name of the British South Africa Company. This latter Company embraces in its operations the immense area lying between the upper and middle Zambesi on the north, and the Crown Colony of British Bechuanaland and the Transvaal border on the south. Its frontiers on the east have not as yet, I believe, been precisely defined; but on the west it is co-terminous with the 20° of E. longitude, which limits the interior boundary of the German territory of Damaraland, etc. The Portuguese dominions on the East Coast may be said to include the Provinces of Sofala, Quilimane, and Mozambique, and to extend up the river Zambesi as far as Tete and the neighbouring rapids. The terms of the Company's charter are very similar to those of the British East Africa Company, though a little more restrictive in regard to its relations with the natives and foreign Powers. It is authorised to acquire whatever concessions it can, including all or any rights, interests, and authorities, also powers necessary for the purposes of government, the preservation of order, the protection of territories, etc. In a northerly direction it can move through the free-trade area, and hold out a hand to the Congo Independent State. It governs, like its sister company, on behalf of the British Empire. It must always remain British in its composition and domicile. It is empowered to abolish by degrees any system of slave-trade or domestic servitude, and to regulate the traffic in intoxicating liquors. It will furnish annually to Government accounts of its expenditure, and generally comply with the wishes of the Secretary of State.

The organiser of this great and laudable enterprise is Mr. Cecil Rhodes; and it does not appear probable that it will encounter any serious obstructions, unless Portugal should create them by sudden intrusion into Mashona-land and other points in the Zambesi basin. And even such obstructions would be fruitless, if Germany and Britain should show themselves superior to national jealousies and rivalries, and co-operate towards the great object of civilising Africa. As much statesmanship, as much common-sense may be shown by the young Emperor of Germany, by Prince Bismarck, and the British Government in honestly co-operating for the welfare of Africa, for all or any of them could display cleverness and diplomacy in mutual rivalries and defeats. Africa is the last continent to be taken in hand as a whole. Let the experience, the wisdom, the errors, and the failures of the past be utilised for the good of the future. There is plenty of room for all, for Africa contains nearly twelve millions of square miles, and is three times larger than Europe. If we wish to squabble, plenty of opportunities may be found in Europe and Asia. In Africa, let Germany and Britain pull together with disinterested single-mindedness, in order to bring light and liberty to the Africans. It is in vain to repine over any errors of the past. We may have erred—even blundered—in Egypt, in the

Transvaal, in our South African Colony—those pitfalls, those graves of many reputations; all the more reason is there to be careful, to be wiser in the future.

Meantime, let me briefly notice one other principal sphere of British influence. I allude to that of the Royal Niger Company, in the north-western part of this vast continent. And here let me premise how much I am indebted to Sir George Goldie and the Administration of the Niger Company for access to their records, and for much valuable information concerning the region under their government or influence. It appears that the history of the Royal Niger Company dates from 1882, when it was constituted under the name of the National African Company, Limited, with a subscribed capital of one million sterling. It commenced operations by taking over the principal British Company then on the Niger. After a severe struggle, which lasted till the close of 1884, two French Companies, which had established a great number of stations in the basin of the Lower Niger and Benué Rivers, retired or were absorbed. A less important British company was also bought out, and the National African Company thus became the only European trader within the sphere of its operations. Having meanwhile acquired rights of jurisdiction over that sphere by some 300 treaties made with the native rulers, it applied for and received a charter from Mr. Gladstone's Government in July 1886, and took the name of the Royal Niger Company, Chartered and Limited. Since then two important English firms have commenced commercial operations under the ægis of the Company.

In order to understand the regions administered by this Company it is necessary to bear in mind the course of the river Niger from its source, not far inland from Sierra Leone, to its numerous mouths in the Bight of Benin. In its north-easterly course to Timbuktu it skirts the interior of the French province of Senegambia. France has already a military post on the Upper Niger, and last year despatched an armed steam-launch down the river almost to the walls of Timbuktu, from which, however, a speedy retreat had to be made, owing to the threatening attitude of the natives. It seems probable that the whole of the Upper Niger will in time pass into the hands of France, when, no doubt, the long-promised railway connecting that river with the Senegal will be completed. After passing Timbuktu, the Niger, turning first to the east and then to the south-east, runs for some hundreds of miles through a sterile and desert region, and has its course broken by numerous cataracts and rapids before it reaches the Empire of Gandu. This fact is specially worthy of notice, as it diminishes the fear of any conflict of British and French interests in that direction,—at any rate, for many years to come. The Niger then flows between various provinces of the Mohammedan Empire of Gandu until it reaches Lokoja, where it receives its greatest tributary, the river Benué, which, rising in the mountains of Adamawa, flows, roughly speaking, westward to Lokoja. On either side of the upper portion of the Benué lie provinces of the Mohammedan Empire of Sokoto. On the north bank of the Lower Benué is a province of the Gandu Empire, whilst the south bank is

occupied by various pagan tribes. Below Lokoja both banks of the Niger and of its numerous tributaries and creeks are also occupied by pagans.

All these pagan regions have been placed by treaties under the authority of the Company, whilst the Sultans of Sokoto and Gandu have, through Mr. Thomson, respectively conferred on the Company, for ever, full rights of jurisdiction over a considerable breadth of territory on either side of the rivers Niger and Benué, where these rivers pass through their dominions. The area thus falling under the jurisdiction of the Company, and known as the Niger Territories, is estimated at about 75,000 square miles. The Sultans of Sokoto and Gandu have also ceded to the Company in perpetuity the introduction, organisation, and control of all foreign trade with their empires.

The capital of the Niger Territories is at present at Asaba, about 150 miles from the mouth of the river at Akassa. At Asaba are the headquarters of the military force, the residence of the Chief-Justice, the central prison, the hospital, the headquarters of the medical department, and the botanical garden. The seaport of the Territories is at Akassa, where are the principal custom-house, the wharves for discharging ocean steamers, and the fleet, consisting of twenty to thirty steamers or launches. These are used for the maintenance of order on the numerous deltaic waterways which intersect the country in every direction, for carrying native produce and European goods to and from the sea, and for conveying the executive officers and the military force from place to place as needed.

Although these waterways and the main Niger itself are for the greater part of the year only navigable by vessels which, when loaded, draw from one foot to four feet, it is probable that they will, until the country is much more developed, tend to prevent the construction of railways, and, indeed, in many places they would make them impossible. Another serious obstacle to the construction of railways in the intensely humid and unhealthy climate of the regions below Lokoja lies in the fact that any considerable turning-up of the soil is fatal to European life.

The pagan regions in the Territories being occupied by some 300 distinct tribes of a very low type of civilisation, considerable efforts have been necessary to check the constant inter-tribal wars by which they used invariably to settle their disputes, and to compel their reference to the arbitration of the Company's Courts. The Company has also engaged in several little wars to punish slave raids and put an end to human sacrifices and other barbarous customs. The principal executive officer is styled the Agent-General, and receives his instructions from the Governing Council in London. He and his principal assistants have no fixed residences, but travel constantly through the Territories settling inter-tribal disputes, and sending cases in which aliens are concerned before the Judicial Court at Asaba. The Territories are, however, divided into a number of districts, in each of which reside a district agent and his assistants, with general powers, limited by an appeal to the Agent-General or the Judicial Court, according as the matter is executive or judicial in its nature.

The principal exports have hitherto been ivory, palm-oil, hides,

kernels, and shea (a vegetable butter); but it is said that a large development has lately taken place in new products, and that rubbers and gums in particular are being exported in quantity. The imports are very varied, the principal items being cottons, silks, woollens, earthenware, hardware, beads, tobacco, and salt. Heavy duties have been imposed by the Company on spirits and gunpowder. The importation of the latter is stated to be insignificant, and that of spirits—never very large—to have been reduced to less than one-fourth of what it was prior to the charter. But this trade in spirits has always been striking as compared with that on the neighbouring coast-line.

The institution of domestic slavery is too deeply rooted in the African nature to admit of its immediate abolition, but the evil is being mitigated under the action of the Company, and will doubtless gradually disappear as it has in Brazil. Lord Aberdare, the President of the Council, in a speech published last July, referred to the efforts of the Company to initiate and encourage agricultural pursuits among the natives, and pointed out that they looked in this direction for the permanent and ultimate development of the Territories. It is said that indigo, tobacco, cotton, coffee, cocoa, and other products can be cultivated to advantage in that climate and soil. It seems certain that by such methods alone can the civilisation of the dense and barbarous populations of those regions be gradually effected. The change must necessarily be slow, and will probably be attended by many mistakes and failures, but I see no reason to doubt its ultimate success. The Company have a really admirable little military force about 400 or 500 strong, who are thoroughly drilled, and work their guns in first-rate style.

Wending eastward from the valley of the Niger we enter that immense region known as the Sudan: sometimes divided into the Central Sudan, stretching straight across Africa to the tributaries of the Nile; the Sudan of the Upper Nile; and the Eastern Sudan, abutting on the Red Sea. Farther eastward we come to the kingdoms of Abyssinia and Shoa, now under the protectorate of the Italian Government; and geographical considerations seem to point to the natural extension of the Italian sphere of influence across the Somali and Galla country to the shore line of the Indian Ocean, from Ras Hafun on the north towards the line of the Juba River in the south. To the northward of Hafun, and so round Cape Guardafui and along the Berbera coast, opposite to Aden, British influence has, of course, long been acknowledged; while a little farther westward the French have a convenient station at Obok.

Having thus made a running survey of our principal protectorates and spheres of influence in Africa, omitting any special reference to our Colonies at the Cape and on the West Coast, permit me before sitting down to summarise the actual situation. The movement which originated this extended political situation dates from no longer back than 1884; in other words, it is of about five years' growth. The commencement of it was in the first stirring of the waters by Germany, along the West Coast, between Lagos and Walfisch Bay. Angra Pequeña was the question upon which matters came to a direct issue. The General Act of the Berlin Conference of (February) 1885, and the official documents

issued, whether by Belgium, Portugal, France, Germany, Italy, or Great Britain, on or within a comparatively short period of the same date, constitute the instruments upon which the present situation rests, and which may be briefly recapitulated as follows:—France, dominant along the northern coast in Fez, Algiers, Tunis, and looking towards Tripoli and Fezzan; France, endeavouring to stretch southward towards the Central Sudan, and located on the Senegal and the northern bank of the Congo from Manganja up to its confluence with the Mobangi River. Belgium, administering the Congo Independent State which, holding the southern bank of the Congo, stretches from the westward in a direct line eastward, then spreading out on all sides, to the Central Sudan on the north, to Lakes Albert Edward, Tanganyika, Moëro, and Bangweolo on the east, and impinging on Muata Yamvo's kingdom in the south. Then from the southern shore of the mouth of the Congo, extending along the shore line, the ancient Portuguese provinces of Loanda, Angola, and Benguela, as far south as the mouth of the river Kunene. Here the coast-line is taken up by the great German Protectorate, extending, with the exception of the small coast enclave of Walfisch Bay, as far south as the Orange River, and including Ovampoland, Damaraland, and Great Namaqualand, its eastern boundary being defined, by the Memorandum of December 1884, to be Longitude 20° East, between the right bank of the Orange River and the right bank of the Okavango River.

On the southern bank of the Orange River begin the British possessions of the Cape, stretching across the continent, and comprising the Cape Colony, the Bechuana Crown Colony, the Bechuana British Protectorate, Kaffraria, and Natal; together with certain tracts within the sphere of British influence, viz.: Basuto-, Zulu-, and possibly Amatonga-lands. Then, following the coast-line of the East of Africa we reach the Portuguese settlements from Delagoa Bay to Cape Delgado, comprising the Portuguese provinces of Sofala, Quilimane, and Mozambique. But before proceeding farther north along the coast-line, I must look a little inland, and indicate the Orange River Free State, the little native state of Swaziland—whose destiny is now being discussed by Sir Francis de Winton—and the South African Republic or the Transvaal, to the northward of which lies the large region before alluded to as having been so recently confided to the administration of the South Africa Company. Returning to the coast at Cape Delgado, or Tunghi Bay, we come upon the German sphere of influence, stretching inland to Lake Nyassa, and embracing the coast-line conceded to the German East Africa Company by the late Sultan of Zanzibar, and which stretches northward to the Umba River about two miles south to the British post of Wanga. Here the British sphere of influence commences, and extends northward, as already described.

It is indicative of the rapidity with which events march that, while I am actually writing this paragraph, the morning press telegraphs the official announcement that Italy has proclaimed a protectorate over the coast-line lying between the ports of Kismayu, Brava, Merka, and Makdishu; while Germany has extended her protectorate to the north of Vitu.

A glance at the map shows that the backbone of the African continent is a line protracted in a north-east and south-west direction along the high-level lake region from South Africa to the Red Sea. It may be objected that it is a long cry from the Cape to Cairo. So it is; but therein lies the problem to be solved. The African question is upon us, and we can no more ignore it than we can the Eastern or the Asiatic questions. There are European powers, and there are the pioneers of civilisation actually at the work, and determined to push on. We, like the others, must put our shoulder to the wheel or else be shunted out of its onward movement. Already there are railways from Cape Town and Port Elizabeth to Kimberley; and a line is projected, and the money forthcoming, for an extension to Shoshong and beyond. While we are assembled here, it is quite possible that arrangements may be in contemplation for connecting Lakes Nyassa and Tanganyika with the Shoshong terminus. These lakes already have cognisance of steam-vessels. The Germans and British may be counted on to connect Tanganyika with Victoria Nyanza, and to place steamers on the Victoria itself, thus debouching on the valley of the Nile, and stretching out on the east to meet the rail to the port of Mombasa, and on the west towards the river transport of the Congo basin and the railway which will soon bridge the unnavigable rapids of the lower reaches between Matadi and Stanley Pool. It is true that the fertile region of the Sudan, from Emin Pasha's province to Khartum, is for the present desolated by hordes of fanatics and slave-traders; but, surely, with our position in Egypt on the north, with the combined influences of Germany and Britain on the south, with the influence of the Congo Independent State on the west, and lastly with the influence of Italy in Abyssinia and Shoa on the east, civilisation should be able to crush slavery and barbarism along the valley of the Nile, and so bring Africa into ordinary communication with the commerce and communities of Europe. Undoubtedly, it is the energy of the individual man that imagines, develops, and creates empire, but, reciprocally, his imperial energies and instincts largely depend upon the character of the State or the nation to which he belongs. The power of command comes with its exercise, but its exercise hangs upon an imperial sphere of work. Such an imperial sphere of work is now before us and before the Germans; let us all show ourselves worthy of our responsibilities. Perhaps no potentates of the past ever had so untrammelled a field for extending beneficent civilisation as have our Queen-Empress, the King of Italy, and the potent Emperor of Germany at this moment. However, while the efforts of our greatest statesmen are liable to be trammelled by the exigencies of party government, upon the young Emperor of Germany and upon the great prince who so firmly serves him, more than upon any other human beings, depend at this moment the destinies of Africa. It is within their power to bring all conflicting or competing interests into one peaceful and civilising stream of light and liberty, or else to permit the currents of dissension to break loose and grow into antagonism, conflict, and possibly war; for one thing is certain—Empire never stands still.

# LETTER FROM MR. HENRY M. STANLEY TO THE ROYAL GEOGRAPHICAL SOCIETY OF LONDON, AND TO THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

CAMP AT KIZINGA, UZINYA,
*August 17th*, 1889.

I REMEMBER, while standing on the edge of the plateau which overlooks the southern end of Lake Albert, in December 1887, that looking across the lake to the Unyoro plateau, and running my eye along its unbroken outline from north to south, I was much struck by the gradual but steady uplift of the land to a point near the lake's end, where a wide cleft separated the plateau from the disjointed mass and higher elevations culminating around Mount Ajif. Southward beyond Ajif we could see nothing but dark impenetrable clouds, ominous of a storm, yet underneath these night-black clouds lurked a most interesting mystery —that of the long-lost and wandering "Mountains of the Moon." Little did we imagine it, but the results of our journey fron the Albert Nyanza to Unyampaka, where I turned away from the newly discovered lake in 1876, establish beyond a doubt that the snowy mountain which bears the native name of Ruwenzori or Ruwenjura is identical with what the ancients called "Mountains of the Moon."

Note what Scheabeddin, an Arab geographer of the fifteenth century, writes: "From the Mountains of the Moon the Egyptian Nile takes its rise. It cuts horizontally the Equator in its course north. Many rivers come from this mountain and unite in a great lake. From this lake comes the Nile, the most beautiful and greatest of the rivers of all the earth."

If, adopting the quaint style and brevity of the Arab writer, we would write of this matter now, we would say: "From Ruwenzori, the Snow Mountain, the western branch of the Upper Nile takes its rise. Many rivers come from this mountain, and uniting in the Semliki River, empty into a great lake, named by its discoverer the Albert Nyanza. From this lake, which also receives the eastern branch of the Upper Nile, issues the true Nile, one of the most famous of the rivers of all the earth."

But this is a matter of slight moment compared to the positive knowledge that in the least suspected part of Africa there has shot up into view and fact a lofty range of mountains, the central portion of which is covered with perpetual snow, which supplies a lake to the south of the Equator, and pours besides scores of sweet-water streams to the large tributary feeding the Albert Nyanza from the south.

You will remember that Samuel Baker in 1864 reported the Albert Nyanza to stretch "illimitably" in a south-westerly direction from Vacovia, and that Gessi Pasha, who first circumnavigated that lake, and Mason Bey, who in 1877 made a more careful investigation of it, never even hinted at the existence of a snowy mountain in that neighbourhood, nor did the last two travellers pay any attention to the Semliki River. I might even add that Emin Pasha, for years resident on or near

Lake Albert, or Captain Casati, who for some months resided in Unyoro, never heard of any such remarkable object as a snowy mountain being in that region; therefore we may well call it an unsuspected part of Africa. Surely it was none of our purpose to discover it. It simply thrust itself direct in our homeward route, and as it insisted on our following its base-line, we viewed it from all sides but the north-east. Only then could we depart from its neighbourhood.

Surrounded as I am by the hourly wants of an expedition like this, I cannot command the time to write such a letter on this subject as I would wish. I must even content myself with allowing a few facts to fall into line for your leisurely consideration.

If you will draw a straight line from the debouchure of the Nile from Lake Albert, 230 geographical miles in a direction nearly south-west magnetic, you will have measured the length of a broad line of subsidence, which is from 20 to 50 miles wide, that exists between 3° N. lat. and 1° S. lat. in the centre of the African continent. On the left of this great trough, looking northward of course, there is a continuous line of upland, rising from 1000 to 3000 feet above it. Its eastern face drops abruptly into the trough; the western side slopes gently to the Ituri and Lomva basins. To the right there is another line of upland. The most northerly section, 90 miles, rising from 1000 to 3000 along the trough, is the Unyoro plateau, whose western face almost precipitously falls into the trough, and whose eastern face slopes almost imperceptibly towards the Kafur. The central section, also 90 miles long, consists of the Ruwenzori range, from 4000 to 15,000 feet above the average level of the trough. The remaining section of upland, and the most southerly, is from 2000 to 3500 feet higher than the trough, and consists of the plateaus of Uhaiyana, Unyampaka, and Ankori.

The most northerly section of the line of subsidence, 90 miles in length, is occupied by the Albert Nyanza; the central section, also 90 miles, by the Semliki River valley; the southernmost portion, 50 miles long, by the plains and the new Nyanza, which we have all agreed to name the Albert Edward Nyanza, in honour of the first British Prince who has shown a decided interest in African geography.

You will observe, then, that the Semliki valley extends along the base of Ruwenzori range; that the northern and southern extremities or flanks of Ruwenzori have each a lake abreast of it; that the Semliki river runs from the upper to the lower lake in a zigzag course.

If you were to make a plan *in relievo* of what has been described above, the first thing that would strike you would be, that what had been taken out of that abyss or trough had been heaped up in the enormous range, and if along its slope you were to channel out sixty-two streams emptying into this trough, and let the sides of the trough slope here and there sharply towards the centre, you would be impressed with the fact that Ruwenzori was slowly being washed into the place whence it came. However, all these are matters for geologists.

For months all Europeans on this expedition, before setting out on their journey towards Zanzibar from the Albert Lake, were exercised in their minds how Sir Samuel Baker, standing on a hill near Vacovia,

five or six miles from the extremity of the Nyanza, could attach "illimitability" to such a short reach of water; but after rounding the Balegga Mountains, which form a group to the south of Kavalli, we suddenly came in view of the beginning of the Semliki valley, a sight which caused officers to ask one another, "Have you seen the Nyanza?" and the female portion of the Egyptian following to break out into rapturous "Lu-lu-lus." Yet we were only four miles away from the valley, which was nearly white with its ripe grass, and which indeed resembled strongly the disturbed waters of a shallow lake.

This part of the Semliki valley, which extends from the lake south-westerly, is very level; for 30 miles it only attains to an altitude of 50 feet above the lake. All this part can only recently have been formed, say the last few hundred years. In one of its crooked bends nearer the south-eastern range we stumbled suddenly upon the Semliki River, with an impetuous volume, from 80 to 100 yards wide, and an average depth of 9 feet. Its continually crumbling banks of sandy loam rose about 6 feet above it. One glance at it revealed it to be a river weighted with fine sediment. When we experimented, we found a drinking-glass full of water contained nearly a teaspoonful of sediment. We need not wonder then that for miles the south end of Lake Albert is so shallow that it will scarcely float a row-boat.

Beyond the grassy portion of the valley, a few acacias begin to stud it, which, as we proceed south-westerly, become detached groves, then a continuous thin forest, until it reaches the dense and rank tropical forest, with tall trees joined together by giant creepers, and nourishing in its shade thick undergrowths. Everything now begins to be sloppy wet, leaves and branches glisten with dew, weeping mosses cover stem, branch, and twig. The ground is soaked with moisture; a constant mist rises from the fermenting bosom of the forest. In the morning it covers the valley from end to end, and during the early hours, stratum after stratum rises, and, attracted by the greater drought along the slant of the Ruwenzori slopes, drifts upwards until the summits of the highest mountains are reached, when it is gradually intensified until the white mist has become a storm-cloud, and discharges its burden of moisture, amid bursts of thunder and copious showers.

The valley sensibly rises faster in the forest region than in the grassy part. Knolls and little rounded hills crop out, and the ground is much more uneven. Violent streams have ploughed deep ravines round about them, and have left long narrow ridges, scarcely a stride across at the summit between two ravines a couple of hundred feet deep. At about 75 miles from the Albert Nyanza the valley has attained about 900 feet of altitude above it, and at this junction the forest region abruptly ends. The south-west angle of Ruwenzori is about east of this, and with the change of scene a change of climate occurs. We have left eternal verdure and the ceaseless distillation of mist and humid vapours into rain behind, and we now look upon grass ripe for the annual fire and general droughtiness. From this place the valley becomes like a level grassy plain until the Albert Edward Nyanza is reached.

The southernmost stretch of the Ruwenzori range projects like a

promontory between two broad extents of the ancient bed of the Albert Edward. To avoid the long detour we cross this hilly promontory in a south-easterly direction from the Semliki valley, and enter eastern Usongora, and are in a land as different from that at the north-western base of Ruwenzori as early summer is from mid-winter. As we continue easterly, we leave Ruwenzori on our left now, and the strangely configured Albert Edward Nyanza on our right. The broad plains which extend between were once covered by this lake. Indeed, for miles along its border there are breadths of far-reaching tongues of swamp penetrating inland. Streams of considerable volume pour through these plains toward the Nyanza from Ruwenzori, without benefiting the land in the least. Except for its covering of grass—at this season withered and dried—it might well be called a desert; yet in former times, not very remote, the plains were thickly peopled—the zeribas of milk-weed and dark circles of Euphorbia, wherein the shepherds herded their cattle by night, prove that, as well as the hundreds of cattle-dung mounds we come across. The raids of the Waganda and the Warasura have depopulated the land of the Wasongora, the former occupants, and have left only a miserable remnant, who subsist by doing work for the Warasura, their present masters.

From Usongora we enter Toro, the Albert Edward Nyanza being still on our right, and our course being now north-easterly, as though our purpose was to march to Lake Albert again. After about 20 miles march we turn east, leave the plains of the Albert Edward, and ascend to the uplands of Uhaiyana, which having gained, our course is south until we have passed Unyampaka, which I first saw in 1876.

South of Unyampaka stretches Ankori, a large country and thickly peopled. The plains have an altitude of over 5000 feet above the sea, but the mountains rise to as high as 6400 feet. As Ankori extends to the Alexandra Nile, we have the well-known land of Karagwé south of this river.

Since leaving the Albert Nyanza, between Kavalli and the Semliki River, we traversed the lands of the Wavira and Babegga. On crossing the Semliki we entered the territory of the Awamba. When we gained the grassy terrace at the base of the Ruwenzori range, we travelled on the border line between the Wakonju, who inhabit the lower slopes of Ruwenzori, and the Awamba, who inhabit the forest region of the Semliki valley. The Wakonju are the only people who dwell upon the mountains. They build their villages as high as 8000 feet above the sea. In time of war—for the Warasura have invaded their country also—they retreat up to the neighbourhood of the snows. They say that once fifty men took refuge right in the snow region, but it was so bitterly cold that only thirty returned to their homes. Since that time they have a dread of the upper regions of their mountains.

As far as the south-west angle of Ruwenzori, the slopes of the front line of hills are extensively cultivated—the fields of sweet potatoes, millet, eleusine, and plantations of bananas describe all kinds of squares, and attract the attention; while between each separate settlement the wild banana thrives luxuriantly, growing at as high an

altitude as the summits of the highest spurs, whereon the Wakonju have constructed their villages.

Though we were mutually hostile at first, and had several little skirmishes, we became at last acquainted with the Wakonju, and very firm, close friends. The common enemy were the Warasura, and the flight of the Warasura upon hearing of our advance, revealed to the Wakonju that they ought to be friends with all those who were supposed to be hostile to their oppressors. Hence we received goats, bananas, and native beer in abundance; our loads were carried, guides furnished us, and every intelligence of the movements of the Wanyoro brought us. In their ardour to engage the foe, a band of them accompanied us across Usongora and Toro to the frontier of Uhaiyana.

South-west of Awamba, beyond the forest region of the Semliki valley, begins Usongora. This country occupies the plains bordering the north-west and north of Lake Albert Edward. The people are a fine race, but in no way differing from the finer types of men seen in Karagwé and Ankori, and the Wahuma shepherds of Uganda. Their food consists of milk and meat, the latter eaten raw or slightly warmed.

The Toro natives are a mixture of the higher class of Negroes, somewhat like the Waganda. They have become so amalgamated with the lower Wanyoro that we can find nothing distinctive. The same may be said of the Wahaiyana. What the royal families of these tribes may be we can only imagine from having seen the rightful prince of Usongora in Ankori, who was as perfect a specimen of a pure Galla as could be found in Shoa. But you need not conclude from this that only the royal families possess fine features. These Ethiopic types are thickly spread among the Wahuma of these Central African uplands. Wherever we find a land that enjoys periods of peace, we find the Wahuma at home, with their herds, and, in looking at them, one might fancy oneself transported from the midst of Abyssinia.

Ankori is a land which, because of its numbers and readiness to resistance, enjoys long terms of uninterrupted peace, and here the Wahuma are more numerous than elsewhere. The royal family are Wahuma, the chiefs and all the wealthier and more important people are pure Wahuma. Their only occupation, besides warring when necessary, is breeding and tending cattle. The agricultural class consists of slaves, at least such is the term by which they are designated. The majority of the Wahuma can boast of features quite as regular, fine, and delicate as Europeans.

The countries to the south of the Albert Edward are still unexplored, and we have not heard much respecting them, but what we have heard differs much from that which you find illustrated by that irregular sheet of water called Muta Nzige, in the *Dark Continent* map.

Ruanda bears the name of Unyavingi, to the people of Ukonju, Usongora, and Ankori, and is a large compact country lying between the Alexandra Nile and the Congo watershed to the west, and reaching to within one day's long march of the Albert Edward. It also overlaps a portion of the south-west side of that lake. The people are described as being very warlike, and that no country, not even Uganda, could equal it

in numbers or strength. The late queen has been succeeded by her son, Kigeri, who now governs.

Since the commencement of our march homewards from our camp at Kavalli, we have undergone remarkable vicissitudes of climate. From the temperate and enjoyable climate of the region west of Lake Albert we descended to the hothouse atmosphere of the Semliki valley—at nearly 3000 feet lower level. Night and day were equally oppressively warm and close, and one or two of us suffered greatly in consequence. The movement from the Semliki valley to the plains north of Lake Albert, brought us to a dry but a hot land; the ground was baked hard, the grass was scorched, the sun, but for the everlasting thick haze, would have been intolerable; in addition to which the water—except that from the Ruwenzori streams—was atrocious, and charged with nitre and organic corruption. The ascent to the eastern plateau was marked by an increase of cold and many an evil consequence, fevers, colds, catarrhs, dysenteries, and paralysis. Several times we ascended to over 6000 feet above the sea, to be punished with agues, which prostrated black and white by scores. In the early mornings, at this altitude, hoar-frost was common; blackberries were common along the path in North-West Ankori, 5200 feet above the sea-level.

On entering Uzinya, south-west corner of Lake Victoria, the health of all began to improve, and fevers became less common.

I have jotted these few remarks down very hastily. Whether it is from lack of wholesome food or not, but I confess to feeling it an immense labour to sit down and write upon any subject. I do not agree with Shakespeare when he says—

> "Fat paunches have lean pates: and dainty bits
> Make rich the ribs, but bankrupt quite the wits."

In our case, and I speak for all our officers as well as myself, "dainty bits" just now would brighten up our wits, for we suspect that our wits have strongly sympathised with the bodies' pains.

That you may know what the upper regions of Ruwenzori are like, I send you Lieut. Stairs's account of his ascent to a height of nearly 11,000 feet.

HENRY M. STANLEY.

## REPORT OF LIEUTENANT STAIRS.

EXPEDITION CAMP, *June 8th*, 1889.

SIR,—I have the honour to present you with the following account of an attempt made by me to reach the snow-capped peaks of Ruanzori:—

Early on the morning of the 6th June, accompanied by some forty Zanzibaris, we made a start from the Expedition's camp at the foot hills of the range, crossed the stream close to camp, and commenced the ascent of the mountain.

With me I had two aneroids, which together we had previously noted and compared with a standard aneroid remaining in camp under your immediate observation; also a Fahrenheit thermometer.

For the first 900 feet above camp the climbing was fairly good, and

our progress was greatly aided by a native track which led up to some huts on the hills. These huts we found to be of the ordinary circular type so common on the plains, but with the difference that bamboo was largely used in their interior construction. Here we found the food of the natives to be maize, bananas, and colocasia roots. On moving away from these huts we soon left behind us the long rank grass, and entered a patch of low scrubby bush, intermixed with bracken and thorns, making the journey more difficult.

At 8.30 a.m. we came upon some more huts of the same type, and found that the natives had decamped from them some days previously. Here the barometer read 23·58 and 22·85; the thermometer 75° F. On all sides of us we could see Dracænas, and here and there an occasional tree fern and Mwab palm; and, tangled in all shapes, on either side of the track, were masses of long bracken. The natives now appeared at different hill-tops and points near by, and did their best to frighten us back down the mountain by shouting and blowing horns. We, however, kept on our way up the slope, and in a short time they disappeared and gave us very little further trouble.

Of the forest plains, stretching far away below us, we could see nothing, owing to the thick haze that then obscured everything. We were thus prevented from seeing the hills to the west and north-west.

At 10.30 a.m. after some sharp climbing, we reached the last settlement of the natives, where the crops consisted of beans and colocasias, but no bananas. Here the barometer read 22·36; thermometer 84° F. Beyond this settlement was a rough track leading up the spur to the forest; this we followed, but in many places to get along at all we had to crawl on our hands and knees, so steep were the slopes.

At 11 a.m. we reached this forest and found it to be one of bamboos at first open, and then getting denser as we ascended. We now noticed a complete and sudden change in the air from that we had just passed through. It became much cooler and more pure and refreshing, and all went along at a faster rate and with lighter hearts. Now that the Zanzibaris had come so far, they all appeared anxious to ascend as high as possible, and began to chaff each other as to who should bring down the biggest load of the "white stuff" on the top of the mountain.

At 12.40 p.m. we emerged from the bamboos and sat down on a grassy spot to eat our lunch. Barometers 21·10 and $27\cdot\frac{95}{120}$. Thermometer 70° F. Ahead of us, and rising in one even slope, stood a peak, in altitude 1200 feet higher than we were. This we now started to climb, and after going up it a short distance came upon the tree-heaths. Some of these bushes must have been 20 feet high, and as we had to cut our way foot by foot through them, our progress was necessarily slow, and very fatiguing to those ahead.

At 3.15 we halted among the heaths for a few moments to regain our breath. Here and there were patches of inferior bamboos, almost every stem having holes in it, made by some boring insect, and quite destroying its usefulness. Under foot was a thick spongy carpet of wet moss, and the heaths on all sides of us we noticed were covered with "Old Man's

Beard." We found great numbers of blue violets and lichens, and from this spot I brought away some specimens of plants for the Pacha to classify. A general feeling of cold dampness prevailed; in spite of our exertions in climbing, we all felt the cold mist very much. It is this continual mist clinging to the hill-tops that no doubt causes all the vegetation to be so heavily charged with moisture and makes the ground under foot so wet and sloppy.

Shortly after 4 p.m., we halted among some high heaths for camp. Breaking down the largest bushes, we made rough shelters for ourselves, collected what firewood we could pick up, and in other ways made ready for the night. Firewood, however, was scarce, owing to the wood being so wet that it would not burn. In consequence of this the lightly-clad Zanzibaris felt the cold very much, though the altitude was only about 8500 feet. On turning in, the thermometer registered 60° F. From camp I got a view of the peaks ahead, and it was now that I began to fear we should not be able to reach the snow. Ahead of us, lying directly in our path, were three enormous ravines; at the bottoms of at least two of these there was dense bush. Over these we should have to travel and cut our way through the bush. It then would resolve itself into a question of time as to whether we could reach the summit or not. I determined to go on in the morning, and see exactly what difficulties lay before us, and, if these could be surmounted in a reasonable time, to go on as far as we possibly could.

On the morning of the 7th, selecting some of the best men, and sending the others down the mountain, we started off again upwards, the climbing being similar to that we experienced the previous afternoon. The night had been bitterly cold, and some of the men complained of fever, but all were in good spirits, and quite ready to go on. About 10 a.m. we were stopped by the first of the ravines mentioned above. On looking at this I saw that it would take a long time to cross, and there were ahead of it still two others. We now got our first glimpse of a snow peak, distant about two-and-a-half miles, and I judged it would take us still a day and a half to reach this, the nearest, snow. To attempt it, therefore, would only end disastrously, unprovided as we were with food, and some better clothing for at least two of the men. I therefore decided to return, trusting all the time that at some future camp a better opportunity for making an ascent would present itself, and the summit be reached. Across this ravine was a bare, rocky peak, very clearly defined, and known to us as the south-west of the "Twin Cones." The upper part of this was devoid of vegetation, the steep beds of rock only allowing a few grasses and heaths in one or two spots to exist.

The greatest altitude reached by us, after being worked out and all corrections applied, was 10,677 feet above the sea. The altitude of the snow peak above this would probably be about 6000 feet, making the mountain, say, 16,600 feet high. This, though, is not the highest peak in the Ruanzori cluster. With the aid of a field-glass I could make out the form of the mountain top perfectly. The extreme top of the peak is crowned with an irregular mass of jagged and precipitous rock, and has a distinct crater-like form. I could see, through a

gap in the near side, a corresponding rim or edge on the farther, of the same formation and altitude. From this crown of rock, the big peak slopes to the eastward at a slope of about 25°, until shut out from view by an intervening peak; but to the west the slope is much steeper. Of the snow, the greater mass lay on that slope directly nearest us, covering the slope wherever its inclination was not too great. (The largest bed of snow would cover a space measuring about 600 by 300 feet, and of such depth that in only two spots did the black rock crop out above its surface. Smaller patches of snow extended well down into the ravine.) The height from the lowest snow to the summit of the peak would be about 1200 feet or 1000 feet. To the ENE. our horizon was bounded by the spur, which, starting directly behind our main camp, and mounting abruptly, takes a curve in a horizontal plane and centres on to the snow peak. Again, that spur which lay south of us also radiated from the two highest peaks. This would seem to be the general form of the mountain, namely, that the large spurs radiate from the snow peaks as a centre, and spread out to the plains below. This formation on the west side of the mountain would cause the streams to start from a centre, and flow on, gradually separating from each other, until they reach the plains below. There they turn to the WNW. or trace their courses along the bottom spurs of the range and run into the Semliki river, and on to the Albert Nyanza. Of the second snow-peak which we had seen on former occasions I could see nothing, owing to the "Twin Cones" intervening. This peak is merely the termination, I should think, of the snowy range we saw when at Kavalli's, and has a greater elevation, if so, than the peak we endeavoured to ascend. Many things go to show that the existence of these peaks is due to volcanic causes. The greatest proof that this is so lies in the numbers of conical peaks clustering round the central mass and on the western side. These minor cones have been formed by the central volcano getting blocked in its crater, owing to the pressure of its gases not being sufficient to throw out the rock and lava from its interior; and consequently the gases, seeking for weak spots, have burst through the earth's crust and thus been the means of forming these minor cones that now exist. Of animal life on the mountain we saw almost nothing. That game of some sort exists is plain from the numbers of pitfalls we saw on the road-sides, and from the fact of our finding small nooses in the natives' huts such as those used for taking ground game. We heard the cries of an ape in a ravine, and saw several dull greyish-brown birds like stonechats, but beyond these, nothing.

We found blueberries and blackberries at an altitude of 10,000 feet and over, and I have been able to hand over to the Pacha some specimens for his collections, the generic names of which he has kindly given me, and which are attached below. That I could not manage to reach the snow and bring back some as evidence of our work I regret very much, but to have proceeded onwards to the mountain under the conditions in which we were situated I felt would be worse than useless; and, though all of us were keen and ready to go on, I gave the order to return. I then read off the large aneroid, and found the hand stood at 19·900. I set the index pin directly opposite to the hand, and we started down

hill. At 3 p.m. on the 7th I reached you, it having taken 4½ hours of marching from the "Twin Cones."

I have the honour to be,
Sir,
Your obedient Servant,
W. E. STAIRS,
*Lieut. R.E.*

H. M. STANLEY, Esq.,
Commanding Emin Pacha Relief Expedition.

*P.S.*—The following are the generic names of the plants collected by me. Emin Pacha has kindly furnished them :—

1. Clematis.
2. Viola.
3. Hibiscus.
4. Impatiens.
5. Tephrosia.
6. Elycina. (?)
7. Rubus.
8. Begonia.
9. Peucedanum.
10. Gnaphalium.
11. Helichrysum.
12. Senecio.
13. Sonchus.
14. Vaccinium.
15. Erica arborea.
16. Landolphia.
17. Heliotropium.
18. Lantana.
19. Moschosma.
20. Lissochilus.
21. Dracæna.
22. Luzula.
23. Carex.
24. Anthistiria.
25. Adiantum.
26. Pellæa.
27. Pteris aquilina.
28. Asplenium.
29. Aspidium.
30. Polypodium.
31. Lycopodium.
32. Selaginella.
33. Marchantia.
34. Parmelia.
35. Usnea.
36. Tree fern.
37. One fern.
38. One Polypodium.

} Unknown.

## THE KARA SEA AND THE ROUTE TO THE NORTH POLE.

(*Read at Meeting of Society, Edinburgh, May* 1889.)

BY CAPTAIN A. HOVGAARD, *Danish Navy,*

*Hon. Corresponding Member, Royal Scottish Geographical Society.*

IT is with great pleasure that I avail myself of the opportunity of reading a paper before this Society, of which I have been a Corresponding Member for some years.

It has been impossible of late years to organise an Arctic expedition in my country, so that I have no new information to give on the subject, but I believe that some remarks on the Kara Sea will have some interest for a British audience, as some enterprising English merchants have taken up the idea of opening up communication with Siberia by this route.

Mr. Sewell recently read a paper on the last cruise undertaken by the indefatigable and energetic Captain Wiggins in the *Labrador*, which demonstrated that the Kara Sea is navigable. In 1882-83 I was in command of the only expedition which has wintered in that sea, and was thus able to study the movements of the ice for a year—my ship being beset by, and drifting with, the ice. I believe no one else has hitherto observed these movements; at least I have never seen them described, but only heard of immense hummocks formed on the coast of

Yalmal, and huge icebergs drifting down from the polar basin, which statements are quite inaccurate. The Kara Sea (by which I mean the sea between Yalmal and Novaia Zemlia) is just like an inland sea, having no communications with any polar basin, and almost all the ice found in it is formed and disappears there. This I will try to prove.

As member of the *Vega* expedition, I visited the Kara Sea in a year which was called exceptionally good, as no ice was visible during the voyage thither: this was in 1878. When I sailed up to these latitudes in the *Dijmphna* in 1882 we saw a good deal of ice, and all the Norwegian walrus-hunters agreed that 1882 was the most severe season they had experienced; 1883 was considered a bad year, but not so bad as 1882.

Though the meteorological conditions of these years have been held to differ considerably, we shall find on examination that the quantity of ice found in the Kara Sea during the last days of summer (the end of September) was the same in all three.

In speaking of a bad season, we always think of the circumstances in the neighbourhood of the straits leading to the Kara Sea, because it is there that vessels are prevented from entering it. These circumstances vary, of course, from day to day, for they are influenced by the slightest wind.

Looking at the map, you will find that the Kara Sea resembles a large sack, open to the north-east and having two narrow openings at the bottom. It is probable that this sack, at the end of the winter (*i.e.* the last days of April), is quite filled up with ice. Of course there are openings in the ice, as is proved by the fact that the wind is able to put the ice in motion, but still the maximum of ice is found at this time.

Before explaining how this ice disappears, we must consider what takes place during the winter. I must first inform you that the ice in the Yugor Strait was broken up very late in 1882, and it was only in the beginning of September that I succeeded in entering this channel. Here I had to wait a week until a southerly wind moved the ice from the shore. I then entered the Kara Sea, and found a lane of open water along the coast. Passing on towards the Yalmal coast, I saw to the north two steamers, beset by the ice and making signals of distress. Entering the pack, I succeeded in reaching one of them, the Norwegian steamer *Varna*, which had on board the Dutch expedition bound for Dickson's Haven. We were then both beset by the ice, the *Varna* for ever, the *Dijmphna* for a whole year. The other steamer, the *Louise*, succeeded in reaching open water, and returned to Europe the same year.

It was on the 18th of September 1882 that the *Dijmphna* and the *Varna* were beset by the ice, in 69° 42′ north latitude and 64° 45′ east longitude. A year later the *Dijmphna* was close to the north-east point of Waigatz Island, and during that time (with the exception of the last four days) we drifted with the ice.

Formerly it was stated that a current, marked also on several maps, followed the east coast of Novaia Zemlia, went round by the straits, through which it sent out branches, and, following the coast of Yalmal, again turned to the north.

This much is certain, that this current does not flow constantly, or we should have been driven to the north-east, but navigators spending a few days there in the summer months and finding that such a current then exists, owing to the powerful influence of the waters of the Obi in the north-east part of the sea and the effect of the north-east winds which blow almost constantly during that season, might be misled into supposing it to be permanent. But it is a mistake to suppose that these two circumstances can produce a regular current, as we shall see later on. From the meteorological observations made every hour all the year round on board the *Dijmphna*, the directions of the winds are on the whole as follows :—

From September to April, SW. ½ W.
From May to August, NE.

During the winter the south-west winds drove the *Dijmphna* to the north, along the coast of Yalmal. As the ice near the coast was prevented from going exactly in the same direction as the wind, it became packed, and, every time we approached the coast, we were nipped. The worst spot was nearest the coast.

Here, on Christmas Eve, the *Varna* was completely crushed, and the immense floe on which we had placed our stores, in case we had to leave our ship, was also broken up, so that we had to jump from one piece of ice to another to save our sledges, boats, and provisions, while the ice was piled up in hummocks to a height of 30 feet. When the drift during a short calm set from the coast, we observed large openings in the ice, which were immediately frozen over again, the temperature during the long winter night having reached about 60° Fahr., but the next storm from the south-west piled it up into still more formidable hummocks. This process is continued all through the winter; every south-west storm forms hummocks by pressing the ice against the coast of Yalmal; the following calm permits the ice to spread and new ice to form, only to be piled up again by the next storm. In this way the ice goes on increasing in quantity, and in April we find the whole sea covered with hummocks.

In April we reached our most northerly point, and in May began to drift towards the Kara Straits under the influence of north and north-east winds. Later on the north-east wind was the predominat
the principal direction of the drift was south-west. At first it
but became more rapid as the summer advanced, which proves
was more open water. If any new ice was formed it was dest
the mutual friction and impact of the pieces. The north-e.
sweeps the ice towards the south-west shores of the sea straight towards the part where the two openings are found. But I do not consider that the quantity of ice in the Kara Sea is to any great extent diminished by part of it passing through these straits, of which the Kara is the more important, being broader and right in the direction of the prevailing wind, while the Yugor Strait is narrow and curved, though it also plays a special part in the hydrography of this sea. Only a small quantity of ice escapes through the straits, and the greater part of it disappears, where it is formed, in the Kara Sea itself. The whole mass is pressed

against the shores of Novaia Zemlia and Waigatz, where the weaker parts melt away, and the rapid drift wears away the under surface of the ice, while the exposed side has already become disintegrated to a large extent by the action of the rain, fog, and sun: the weaker parts burst, and the huge hummocks have room to move.

This pressure goes on continually; the weaker piece of ice being forced over or under the stronger one, so that a larger surface is exposed to the direct action of the destructive powers—the rain, fog, and sun. The water trickles down the immense hummocks as they daily diminish, while at the same time the under parts are worn away by the swift eddying drift. The work of destruction proceeds at an incredibly rapid rate, even in the centre of the pack, but at the edge, nay, even several miles from it, the force of the swell is seen. The floes are rocked up and down, and in a short time completely broken up, partly by the friction between the fragments and partly by the impact of the water as it washes over and against their sides. No one who has not seen it can imagine the effect of the water's movements even in the smallest opening.

When, in the month of May, we began our drift to the south-west, we had about sixty miles between us and the coast of Yalmal entirely covered with hummocks, and while the ice to the west of us was being crushed to pieces, or was disappearing through the Kara Strait, we were drifting slowly away from the coast. The open water which was thus formed to the east of us could not freeze at that season of the year, but as it increased in extent the waves beat more violently on the eastern edge of the pack, and forced their way further and further into it. This disintegration went on with such astonishing rapidity that in the month of July the ice a few miles to the east of us was all broken up by the swell. Thus, in two months' time, the waves, with the assistance of rain, fog, and sun, had totally destroyed most of the ice that, at the end of the winter, had lain between us and the shore. During that period we had drifted 60 miles to the south-west, so that at the end of July a belt of over 100 miles of open water was found close to the west coast of the Yalmal peninsula. At the same time an equal amount of ice must have disappeared to the west of us, for a belt of open water, 60 miles broad, stretched across the whole sea in a north and south direction.

In August the circumstances were changed, as the ice was by that time broken up all round us, and we were no longer frozen up in the centre of a solid pack. It was broken up to a certain extent on the 11th of July, and, as time went on and the movement increased, the ice diminished in quantity, and what remained was enabled to drift more rapidly.

At the beginning of August we were about 20 miles away from Waigatz Island, and observed that the movement of the ice in our neighbourhood was not so regular as formerly; it did not, as hitherto, invariably follow the direction of the wind. The idea struck us that the whole pack was trying to force its way through the Kara Strait, and, as this was too narrow an outlet for so huge a mass, there resulted a sort of conflict between the floes to the north of us and those to the south; at one moment the former seemed to push everything before them, and the

next the latter seemed the more powerful, and forced their way towards the disputed passage. We were unfortunately situated just at the north-east of the point to which the ice converged, so that we were constantly squeezed by the ice. Every day our surroundings were so much altered that the floes, the forms of which we had become familiar with during the winter, were quite transformed and unrecognisable. It was here that we lost our propeller, and were reduced to the condition of a sailing vessel.

Even to the east of us everything was changed. At the beginning of August we had advanced rather faster than the ice to the north and south of us, which had closed up to the east in the wake of our track, and we were now far from the open water situated in that direction. The existence of the whirlpool, in which we were carried towards the Kara Strait, is easily explained. The constant NE. winds must increase the level in the Kara Sea; the narrow and shallow straits not permitting the water to escape as quickly as it enters from the NE., we have much the same phenomenon as would be presented by pouring water into a sack or tub with a narrow opening in the bottom; inside and near this opening a whirlpool would naturally be formed. This seems to explain the irregular movements of the ice above referred to. As regards the statement frequently made that there is an east-running current through the Yugor Strait, since the openings are not situated exactly in the bottom of the "sack," it is quite natural to infer a different movement of the water in each, or on either side of one, of them. The whirlpool causes a current through the Kara Strait, and, as the water flows directly through it from the north, the result is that the level of the south-eastern part of the Kara Sea would be reduced, were not this loss compensated for by the water which flows in through the Yugor Strait, and to a certain extent by a counter current which, hugging the shores of the Kara Strait, follows the coast of Waigatz Island. I myself have observed a similar current off the southern shores of Novaia Zemlia. This explains the fact that Norwegian walrus-hunters have in vain tried to force their way through the straits, though they found no ice to the west of Waigatz Island, whereas at the same time others entered the Kara Sea round the north of Novaia Zemlia without seeing ice, except when they approached the shore, and that only in the beginning of September was it possible to escape by the southern straits. The conditions outside the straits have nothing to do with the breaking up of the ice in the Kara Sea, very little ice escaping with the water which finds an outlet through them.

I will now proceed to show why the sea to the NE. has no effect in modifying the conditions of the ice within the Kara Sea. Though the "sack" is perfectly open in that direction, I do not believe the statement, so frequently repeated, that ice is driven by that entrance into the Kara. I myself never saw any in this inland sea, as I may term it, which was not formed within its limits, and the explanation of this fact is not far to seek. The ice on the river Obi breaks up while the Kara Sea is still blocked up by ice, formed on the spot during the winter, when SW. winds prevent any from entering from the NE. There is therefore at that time no room for the ice carried down by the river, which accordingly

finds another way of escape, probably the channel between Novaia Zemlia and Franz Josef Land, as I shall show presently. How otherwise can the presence of Siberian driftwood on the NW. shores of Novaia Zemlia be accounted for? It must, of course, be carried thither by the ice and water proceeding from the Obi and Yenisei. But it may be objected that Siberian driftwood is found also on the NE. shores of Novaia Zemlia. That is true, but it is carried there later in the season, when the ice of the Kara has receded to the SW., and none is borne down by the waters of the Obi and Yenisei. A considerable portion of the waters of these two Siberian rivers does find its way into the Kara Sea, a fact which I shall have occasion to refer to again in the latter part of my article, but it is at a season when, far from adding to the accumulations, they promote, in consequence of their higher temperature, the dissolution of the ice already existing there. We shall also find that the sea to the NE. of the Kara Sea proper is not subject to the influence of any polar basin, and that, if the name be employed to denote the whole sea from the Yugor Straits to Cape Chelyuskin (or North-East Cape), the whole area is essentially an inland sea.

Enough has now been said to explain the difficulties which all navigators encounter on the east coast of Novaia Zemlia. The waters of the Obi press the ice of the Kara Sea with great force against its shores, and, so far, exert an unfavourable influence, but, on the other hand, the stream by its great volume and comparatively high temperature prevents any ice from entering the sea from the NE. Moreover, the immense amount of mud carried down in the course of ages by the Obi and Yenisei, and deposited outside their estuaries, have formed a barrier which protects the Kara Sea on this side. There is yet another fact which tends to prove that the Kara Sea is unaffected by the adjacent Arctic regions. Weyprecht says that the low level of the Arctic Ocean during the winter gives rise to a current from the Atlantic, which enters along the bottom —a fact well established but difficult to account for. In the Kara Sea, however, we always found the temperature at a depth of from two to three fathoms constant (about 28° F.). A current of warmer water was observed on the surface to the west of the Kara Straits, but it did not cross the bar.

In the next place I shall endeavour to prove that the quantity of ice in the sea was very nearly the same in the three years I visited it, viz., 1878, 1882, 1883, though I am well aware that these years are considered to have differed considerably as regards the ice. On July 10, 1878, the ice in Yugor Strait lay in scattered sheets. In the Kara Sea it lay close to the north-east point of Waigatz Island, and thence extended to the south-east, east, and north-east to within 10 to 20 miles on an average from the coast. At 69° N. lat. the ice was so scattered that it was possible to approach the coast of Yalmal. Here the pack was so near to the land that a lane of open water could only be found close inshore, at a depth of 4 or 5 fathoms. Further north, at 73° N. lat., it was about 40 miles from the coast, and from this point its edge might be skirted, at the beginning of August, up to the north-east point of Novaia Zemlia. At that time there was no ice in the south-western part of the

Kara Sea, except small quantities on the east coast of Waigatz Island, and about 50 miles to the west and north-west of White Island, and the Yugor Strait was completely free, yet very little could have escaped by the Kara Strait, for none was visible to the west of it.

During the end of August and the beginning of September several walrus-hunters followed the eastern edge of the pack southwards from the north-east point of Novaia Zemlia. It extended to a breadth of 40 miles off Matthew Strait and blocked up the southern straits, but it was so scattered in the neighbourhood of Yugor Strait that the vessels were able to sail out of the sea by that channel. There was then no ice to the east, and a few days later it had again disappeared from the southern straits. It is evident, then, that even in this year, which has gained the reputation of having been exceptionally good, there was plenty of ice, though, in the position to which the wind drove it, it was no obstacle to navigation. Moreover, the absence of ice to the west of the straits would add to the apparent excellence of the season. In 1882 the sea to the west of the straits was in a very unfavourable condition, owing solely to the westerly winds, which during this summer prevailed in Barents Sea, and the *Varna*, *Louise*, and *Dijmphna* were the only vessels which succeeded in entering the Kara. The first two steamers entered by the Kara Strait, and were drifted with the ice along the coast of Waigatz Island, and then rapidly to the south-east. Captain Knudsen of the *Varna* always maintained that immediately after passing through the strait they were not far from open water, which lay to the north-east, but, as they were prevented by a dense fog from reaching it, they remained in the midst of the ice. The *Dijmphna* waited for a long time outside the Yugor Strait, until a southerly wind drove away the ice from its eastern mouth. This movement indicates that there must have been open water to the north-east. As I mentioned before, we found a lane of water along the shore, and we could, I feel sure, have reached the Yalmal coast the next day, had we not been obliged to enter the pack to assist the other ships. I did not, of course, dream for a moment of helping them out of the pack—this could only be done during some opportune movement of the ice, but I knew that they had neither clothes nor provisions, whereas I had enough for all. When, a few days later, the *Louise* gained the open water, which we had followed before, while the *Dijmphna* was drifted northwards with the pack, no ice was visible from her decks to the east and south-east. She was then about 10 miles distant to the south-west. These rapid movements of the ice prove that there could be no great quantity of it, and it is very probable that in 1878, if a ship had entered the pack, which, at the end of August in that year, lay off the southern straits, she would have passed through the same experience as we did in 1882.

In July 1883 a large open bay was found in the pack off Yugor Strait, and at the beginning of August a similar one was found off the Kara Strait. This was precisely at the time when we were drifting northwards. Later in the season the ice closed up to the straits again, while we drifted southwards. In the middle of September, when we got free, we had only to sail about half-a-dozen miles to reach the western edge of the pack. On approaching Waigatz Island we again met with a belt

of ice, but it must have been small, for we had to enter it for a short distance only in order to attain a position whence we might drift out with it through the strait. At the same time, a walrus-hunter at the north-west point of Waigatz Island saw no ice to the north-east.

The two years we have just been considering have been pointed out as particularly severe, and yet the rapid movements of the ice and other observed facts lead us to the conclusion that, towards the end of summer, the ice in the Kara Sea was restricted to a belt along the east coast of Novaia Zemlia and the coast of Waigatz Island, exactly as it lay in the good year 1878.

The next question is, Was the winter of 1882-3, the only one during which vessels have remained in the Kara Sea, a normal winter? I believe it was, and for the following reasons.

The depth of the sea in the southern part, off Yugor Strait, is considerable—more than 100 fathoms—and a deep depression lies also along the east coast of Novaia Zemlia; but in the middle, on the axis of the Kara Strait prolonged, we found a ridge ending to the north in a large bank, which I named, after our ship, the Dijmphna Bank. It will be remembered that the hummocks are formed by the ice being pressed against the coast of Yalmal during the winter, and probably many of the largest, which perhaps survive two winters, are formed near the coast, where they sometimes run aground. Here they pick up a quantity of clay which is distributed over the ice by subsequent compressions. Indeed, we always found, when the snow above had melted, that the ice was thickly covered with clay. Now in the summer, when the ice is borne towards the Kara Strait, it is precisely above the ridge just mentioned that the hummocks are subjected to the greatest pressure and are crushed to pieces, so that the clay falls to the bottom of the sea, and, since such is the origin of the ridge, it is evident that the movements of the ice must have been for many long years such as I have indicated.

This being so, the navigation of the sea becomes a very simple matter. It is only necessary to know the condition of the sea in the immediate neighbourhood of Yugor Strait, so as to choose the most suitable time for passing through it, after which the way to the Obi and Yenisei will present no difficulties. There is already a Russian settlement on the strait, which will no doubt at no distant time be placed in telegraphic communication with Archangel, so that the state of the ice may be made known by cable. I am quite certain that sooner or later a regular trade will be established by this route with Siberia, and that its abundant products will be carried to Europe at a far lower cost than at present.

It is for this reason that the Kara Sea is now attracting so much attention, but it has another claim to our interest, for it is the only route to the North Pole still left untried.

In 1882 I proposed in Denmark that an expedition should be sent out by this route to Cape Chelyuskin, for the purpose of searching for a passage to the North Pole from that point. I had then formed a theory of my own as to the distribution of land and water around the Pole, and the experience I have since gained is all in favour of the correctness

of that theory. Though I was prevented from carrying out my plan and may not succeed in organising another expedition, some one else may try it, and I am sure that at some future time this will be the route to the North Pole. The kind of route I mean is a coast line running north and south, for by no other is it possible to advance in those latitudes.

On looking at the map[1] you will find two pieces of paper attached to it. They mark out the areas which are no doubt occupied partly or entirely by land, while outside of them it is highly improbable that any land is to be found. The strait which separates them may lie more to the east or west, or there may be more than one. All I wish to indicate is that, somewhere in these regions, there must exist a connection between the Eastern Siberian Sea and the Palæocrystic Sea of Nares.

I shall now invite your attention to the threshold of the unknown regions, as Clements Markham so appropriately calls it, and set forth the various reasons on which my theory of the distribution of land and water round the Pole is based.

Turning first to Spitzbergen, we find that the Arctic Ocean probably extends far beyond these islands, for on their northern side a depression, more than 1300 fathoms in depth, runs in a northerly direction between Greenland and Franz Josef Land. Parry, at 82° 45′ N. lat., saw to the north radiating ice-blinks, showing that the rough pack-ice on which he was travelling extended much further in that direction. The fact, that at this latitude he found the ice going to the south rather than to the west, would seem to imply that Franz Josef Land was its western boundary, as is indicated by the paper on the map. Payer found all the icebergs in Austria Sound drifting northwards, from which we may infer that the sound opens out in that direction; and, indeed, we may conclude that that part of Franz Josef Land, which lies to the west of this sound, consists only of a group of islands extending but a short distance to the north-west. Again, the comparatively warm northerly winds, which blew at the winter quarters of the *Tegetthoff*, seem to confirm the view that no large tracts of land exist in this direction.

With regard to Greenland, in the next place, there is every probability that this country does not extend much further north than 84° N. lat. The east coast has been thoroughly explored up to Cape Bismarck, and Lambert, in 1670, is said to have seen it two degrees further north. Lieutenant Lockwood, of the Greely Expedition, followed the west coast up to about 40° W. long., and the most northerly point he saw was at about 83½° N. lat. A comparison of the winds and currents from observations made on both coasts of Greenland leads us to the conclusion that the coast turns southwards near Lockwood's furthest point and trends towards Lambert's furthest and Cape Bismarck. Moreover, Professor Haughton found that the time which the tidal wave, after flowing northwards along the east coast of Greenland, took to reach the winter quarters

[1] Of the pieces of paper referred to by Captain Hovgaard, one, of an oval shape, extended from the North Pole to 75° N. lat. and ended in a point on the meridian of Wrangel Island (180°), and the other included Franz Josef Land and extended in front of the Kara Sea almost to Cape Chelyuskin. The strait was placed on the meridian of this Cape.

of the *Alert*, postulated a passage, which cannot be situated much further north than 84° N. lat., and Greely observed that the tide here came from the north, whereas at Melville Bay it comes from the south. Water therefore extends from the north of Spitzbergen along the north coast of Greenland, and the Atlantic is in uninterrupted connection with the Palæocrystic Sea of Nares.

The supposed extent of this sea has been enlarged from time to time. From the immobility of the ice masses, which Collinson noticed to the north of Behring Strait, and also from the slow drifting of the *Jeannette* during her first year, Sherard Osborne supposed that they floated on an Arctic Sea hemmed in on all sides, a northern prolongation of the Parry Islands being the boundary on that side.

But Belcher's observations in Northumberland Sound (Queen's Channel) indicated that large landless regions lay to the north and west, because, among other reasons, the water was violently agitated, and the ice was often broken up, by storms from these quarters. In late years, Captain Aldrich, of the Nares Expedition, and Greely, have shown that Cape Columbia is the most northern point of the American Arctic Archipelago, and that at 83° N. lat. the coast turns to the south-west. Petermann would limit this Arctic Sea by a prolongation of Greenland over the North Pole towards Wrangel Island, but this has been proved to be an erroneous idea, so that we have a broad arm of open sea extending down to Point Barrow.

How broad this arm is we cannot decide at present, but, judging from the nature of the ice and other circumstances, we must allow it a considerable breadth. To determine its northern and western limits we must continue our circuit of the Pole.

That there is a country north of Wrangel Island, the south-west coast of which extends towards Cape Chelyuskin, cannot be doubted for a moment. The circumstance that the northerly, and particularly the north-easterly, winds which we felt at the winter quarters of the *Vega*, were comparatively warm, indicates the existence of the expanse of open sea just mentioned, while the low temperature of the north-westerly winds was a sign that a considerable tract of land must have been situated in that direction. The almost trade-wind-like character of these winds confirmed the evidence of their temperature. Another proof is derived from the flight of the birds, which passed by our winter quarters in immense flocks of various species, for their destination could not possibly be Wrangel Island, seeing that the Americans, who visited it, noticed particularly the striking absence of animal life there during the summer. Again, the soundings taken at various points of the sea to the north of Wrangel Island attest still more strongly the existence of this land. Berry, in the steamer *Rodgers*, found that the depth increased as he sailed to the north-north-east from Wrangel Island, whereas, when he sailed due north, the depth decreased to 32 fathoms and, further on, to 20 fathoms. He did not actually see land, but he only reached 73½° N. lat., so it might very well begin at 75° N. lat.

Supposing now that the southern point of this land is situated at 75° N. lat., the soundings and winds above mentioned show that the

eastern shore near this point must trend northwards. If we go further north, we must confine the land within the limits indicated on the map on account of the observations made by Belcher, and by Nares at his winter quarters. At a meeting of the Royal Geographical Society in London, shortly after the return of the expedition, Nares said: "Whether the sea, on the border of which we remained for eleven months, extends to the Pole, or across the Pole, we cannot be absolutely certain; but by reasoning we may safely predict that a very broad opening exists north of Cape Columbia, and I have reason to believe that it extends as far as the Pole." Greely was of the same opinion.

Now, going back to the southern point of this unknown land, which lies to the north of Wrangel Island, we shall find the course along which the *Jeannette* drifted an excellent guide whereby to determine its south-western limit. This vessel entered the pack in the vicinity of Herald Island, and was soon set fast in the ice, with which she was carried in an undeviating course to the north-west. The first winter the drift was so slow that by next summer she was in the neighbourhood of Wrangel Island. In the middle of the second winter, when the ship was at 73° north latitude, exactly to the south of the supposed point, the drift became very rapid, still tending to the north-west. At this point the vessel was evidently caught by a current, which came from the north along the east coast of the land in question, and swept round its southern point. The general direction, then, of the other coast must be north-westerly, following the direction of the current.

De Long, like Berry, found a depth of about 30 fathoms north of Wrangel Island, but, as he drifted during the third summer to the north-west, he found that the depth increased until it amounted to 80 fathoms to the north of the newly discovered islands northwards from the New Siberian Islands. We have, then, connecting this unknown country with Asia, a subaqueous ridge, the eastern side of which is marked by Wrangel Island, and the western by the New Siberian, Bennett, Jeannette, and Henrietta Islands. This, perhaps, was the route by which the Omokes, who are said to have disappeared to the north, found their way, by crossing from one island to another, to the mysterious country, where startling phenomena may reveal themselves to the inquiring explorers of Europe and America, who will certainly reach it sooner or later.

Let us now proceed westwards to Cape Chelyuskin. To the west of this point the water is shallow, whereas, when I was there in the *Vega*, we found 70 fathoms close to the shore immediately after rounding the point; and Pronchicheff, in 1736, found no bottom at 120 fathoms. further to the east. We must, therefore, conclude that this depression is not connected with the deep water already mentioned along the coast of Novaia Zemlia, but, more probably, with the basin near Henrietta Island.

We know that the *Jeannette* sank, in June 1881, at 77° 15′ north latitude, and 155° east longitude, and that some stores left by the retreating party on the ice were found three years later on the ice off the south-west coast of Greenland. We are well acquainted with the drift along the east coast of Greenland, round Cape Farewell, but how

did this ice reach the east coast? For various reasons, which I will give you presently, I do not believe that it passed between Cape Chelyuskin and Franz Josef Land, and therefore I have marked the strait as you see it on the map. Nares said that the ice near his winter quarters, for some reason he was unable to explain, set in from the north towards the coast, and it seems to me a very natural explanation that a communication exists between the deep basin north of Siberia and the deep basin north of Spitzbergen and Greenland. This is how I have fixed the north-western boundary of the unknown land north of Wrangel Island.

Finally, let us turn our attention to Franz Josef Land. Many circumstances show that it extends eastwards to within a short distance of Cape Chelyuskin. In the first place, Payer mentions the mighty Dove Glacier, on the eastern side of Austria Sound, the front of which extends in a northerly and southerly direction over more than half a degree of latitude. It must have its origin on extensive uplands, which would, most naturally, be sought for in a direction perpendicular to its front, that is, precisely in the direction of Cape Chelyuskin. Secondly, in 1878, a large flock of Brent or Barnacle Geese was seen at Cape Chelyuskin, evidently coming southwards from a country lying to the north. The constant north-east winds observed at the winter quarters of the *Tegetthoff*, and the depths in the northern part of the Kara Sea—by no means the least important indications—point to the existence of a large tract of land in this direction. The belt of deep sea passing between Franz Josef Land and Novaia Zemlia turns, as already stated, southwards along the east coast of the latter island, while further to the east, on the meridian of Lonely Island, no greater depth than 50 fathoms can be found, even as far north as 78° north latitude. In 1664, a Dutch whaler, Vlaming, found that, as he sailed to the north and north-east from Novaia Zemlia, the depth of the water decreased, and, when he had reached a distance of 280 miles from the north-east point of that island, he found a bottom of clay at a depth of 4 to 5 fathoms, so that he supposed himself to be near some unknown land. We may judge his position to have been at about 81½° north latitude, and 79½° east longitude.

We conclude from these facts that Franz Josef Land extends to within a comparatively short distance of Cape Chelyuskin. We should remember that the whole basin between the Yenisei and Novaia Zemlia was probably much deeper originally, but has been silted up by the rivers in the course of ages. Now, it would be very difficult to account for the sudden cessation of this filling up just at Cape Chelyuskin, if a wide sea existed to the north of this promontory, whereas, if it is only a strait with a current running north at its eastern extremity, the silting up will naturally be thus confined. The waters of the Obi and the Yenisei probably escape to the west between Novaia Zemlia and Franz Josef Land, as I have already mentioned, but if there were a broad opening to the north-east of them, it would be their more natural channel, considering the effect of the rotation of the earth.

Lastly, I shall allude to an old Dutch map of 1612, which is to be found in De Veer's book on the voyages of William Barents. It was drawn by Isaac Massa, and published by Hessel Gerard. Here we find

the Yalmal peninsula and White Island marked, and further to the east another, which may be Lonely Island, rediscovered in 1878 by the walrus-hunter Johannessen: to the north of this we find on the map a large country, which cannot be Novaia Zemlia, as this island is shown, quite correctly, more to the west. In several details this map is incorrect —the straits leading into the Kara Sea, for instance; but, for all that, many things which Massa says he heard from the Russians may be correct.

We are now come to the end of our examination of the threshold of the unknown regions, and have sketched roughly the outlines of the two countries which are supposed to be situated there.

If now we inquire by what way we can enter the unknown regions and advance as near as possible to the Pole, we must first, if our theory be correct, reject all former routes. Nordenskiöld's and Parry's experiences on the Spitzbergen route and those of Nares on the west coast of Greenland, render it probable that by these routes a latitude much higher than 84° N. lat. can never be reached. Comparing the experiences of De Long, Berry, and Hooper, with the results attained by Collinson, Maclure, and other discoverers, we must consider that the advantages of the route to the north of Behring Strait are at least very doubtful. There is, certainly, here more than elsewhere, a chance of finding a coast-line running approximately to the north and leading to high latitudes; but, on the other hand, there is but a slight prospect of reaching the southern termination of this shore. Finally, with regard to Franz Josef Land, the fate of the *Tegetthoff* and the *Eira*, as well as the experience of the *William Barents*, have shown us that it is very difficult to reach the western coast of that land, so that the practicability of this route is somewhat doubtful. On the other hand, the plan of reaching Franz Josef Land *viâ* Cape Chelyuskin is well worth trying, for I have proved beyond doubt that it is possible to enter the Kara Sea, even in so unfavourable a season as that of 1882; and I am quite sure that, had I not fallen in with the *Varna*, I should, as I said before, have been in open water close to the coast of Yalmal by the next day. If, then, Franz Josef Land really lies near this point, we are more likely to reach the base of our operations easily and safely by this route than by any other. When I conceived this plan, in 1882, it was said that in the strait north of Cape Chelyuskin the same currents would be found as between Franz Josef Land and Novaia Zemlia—that is, a current in the southern part running eastwards and another in the northern part running westwards—and that, therefore, the ice would prove as formidable an obstacle here as it was to the *Tegetthoff* north of Novaia Zemlia. This is, indeed, possible, but hardly probable. In the first place, the *Tegetthoff* no doubt drifted chiefly from the action of the wind: then again, even if such currents do exist to the north of Novaia Zemlia, it seems reasonable to expect that currents in the Kara Sea will act as in such inland seas as the Baltic and Kattegat, if there be only a shallow strait to the north of Cape Chelyuskin. Now we know that in the Skagerrack westerly currents flow regularly under the coast of Norway, and easterly currents under the coast of Denmark, and the same phenomenon may occur here, the currents being confined to the deeper parts of the sea.

If there were a current flowing west to the north of Cape Chelyuskin, it would probably be connected with the great current along which the *Jeannette* drifted, and it would, then, be much more perceptible north of Lonely Island and south of Austria Sound than it actually is. The fact seems to be that entirely local currents exist in both places. When the Austrians abandoned the *Tegetthoff*, they drifted for the first two months due north, that is, at right angles to the direction of the supposed current. Leigh Smith also observed that the ice drifted in a direction running north and south. Johannessen mentions a current flowing from the north near Lonely Island, which may with every probability be ascribed to a peculiar conformation of the fiords on the southern coast of Franz Josef Land. If such be the case, this land cannot be far off.

The current, however, with which the *Jeannette* drifted must, in consequence of the rotation of the earth, have a tendency to go eastwards, and, therefore, follow the western shore of the unknown land to the north of Wrangel Island, so that it is after all possible that an easterly current is to be found north of Cape Chelyuskin, and this, owing to the waters of the Obi and Yenisei, must be warm.

If the south-eastern point of Franz Josef Land be once reached, a coast will no doubt be found running approximately northwards, and, following this, the explorer may reach a strait where it will be possible to gain the opposite shore, which, as we have seen, leads to very high latitudes.

I have now arrived at the end of my paper, and have proved, I trust, that the Kara Sea is at present the most interesting part of the Arctic regions, leading as it does not only direct to the shores of Siberia, so important from a commercial point of view, but also to the richest field of scientific research. I tried myself to make use of this pathway in 1882, but it is very doubtful, as I have said, if I shall ever succeed in organising another expedition to these seas. I am quite sure, however, that other explorers will, sooner or later, try this route; and I believe that they will advance further towards the Pole from the Kara Sea than from any other point.

## DISCUSSION.

Dr. John Murray, who presided, stated that he had spent a season in the Arctic Regions about twenty years ago, cruising between Spitzbergen and the ice off the east coast of Greenland, and had also landed at Cloven Cliff, one of the northern points of Greenland. They were frozen in the floe for three weeks in about lat. 76°, and were carried a long way south during that time. He had picked up many pine-trees frozen in the ice-floes, and had also found river detritus on some of the floes. He felt convinced that these trees had been carried over the Pole, having originally been brought into the Arctic Ocean by the Siberian and American rivers. He did not think that there was much land of any kind towards the North Pole. He never saw anything that could be called an iceberg in these northern waters: nothing in any way comparable with the icebergs from Davis Straits or with the huge table-shaped bergs they had seen in the Antarctic Ocean. He believed there

was a rather deep ocean towards the North Pole, and that the ice moved southwards from this ocean every season. In his opinion the proper way to reach the Pole was to follow the course the *Jeannette* had proposed to take. This, with a fair share of good luck, would bring the explorers out into the Atlantic probably in one or two seasons.

Professor Copeland begged to point out a circumstance bearing on Captain Hovgaard's views which he did not recollect having seen in any book, viz.: that the vast current of ice, 50 or 100 miles in width, that moves incessantly southward down the east coast of Greenland, is originally composed entirely of sea-ice, and must consequently come from some large area of water to the north. From lat. 73° downwards indeed, large numbers of veritable icebergs of huge dimensions are thrown into the current by the glaciers in the larger fiords, as the second German Arctic Expedition, to which he was attached, had had opportunities of observing in 1870. This total absence of true bergs in the current north of 73° made it improbable that there was any continental extension of Greenland into unexplored regions towards the North Pole. The character and circumstances of the drift of the East Greenland ice were abundantly demonstrated by their unfortunate consort the *Hansa*, which was beset in lat. 74°, at the beginning of September 1869, and whose crew had eventually to seek shelter on a large floe, on which they drifted some 200 days before they succeeded in reaching the land near Cape Farewell, coasting the shores of which they eventually made their way to the settlements on the west coast. Had they but known, they might have remained quietly where they were, for the floe on which they had passed the winter actually rounded Cape Farewell under the action of the current, and proved a perfect godsend to the Eskimos, who found on its surface many articles of great value to them. In conclusion, he hoped that Captain Hovgaard would succeed in organising a Polar expedition, and might have the pleasure of leading it to the North Pole by the promising route from Cape Chelyuskin.

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## OBITUARY: 1889.

Douls, Camille.—France in the past year has had, like Germany, to mourn the loss of a young and intrepid African traveller; for Camille Douls, distinguished as the explorer of the Western Sahara, appears to have been treacherously assassinated while making his way across the desert to Timbuktu. M. Douls was born at Bordes in the department of Aveyron in 1864, and received his education at the Lyceum of Rodez, the capital of that department. In 1881 he visited the Antilles and Central America, and four years later, Marocco, where, during a residence of some length, he studied the language, manners, and customs of the Arabs. Here he conceived the bold idea of exploring the hitherto unknown western parts of the Sahara. In prosecution of this design he passed over to the Canary Islands, and there engaged the services of some fishermen to take him over to the desert coast, in the neighbourhood of

Cape Garnet. Having been landed there in safety, he proceeded inland, alone and in the disguise of a Mussulman. He soon fell into the hands of a nomad party, and only saved his life by agreeing to profess Mohammedanism and become a member of the tribe to which his captors belonged. With this roving band he travelled over a great part of the Western Sahara, reaching the tropic of Cancer and finally making his escape over the Atlas to Marocco. Here, however, he was imprisoned by the Sultan, and only regained his liberty through the interference on his behalf of the British Minister. After this he came to London (in 1887), and published in *The Times* newspaper a narrative of his romantic adventures. Appearing before the Royal Geographical Society, he exhibited a rough route-map of his wanderings, which embraced wide tracts previously quite unknown. Having next year returned to his native country he there obtained funds to enable him to undertake a second journey, and for this purpose he left Paris in June, 1888. News afterwards came that a traveller, in the disguise of a Mussulman, had been murdered by his guides in the Sahara, between the oases of Alouef and Aklabi, which lie about 560 miles south from Oran on the Mediterranean coast. There can be little doubt that this unfortunate traveller was Camille Douls. It would appear that he reached the desert by way of Tangiers and Tafilet. It was his great desire to emulate the deeds of René Caillé, who some seventy years ago made himself illustrious by his explorations in the same desert.

Gamble, John George.—By the death of Mr. Gamble the Hydraulic branch of the Engineering profession has lost one of its ornaments, and our Society one of its Honorary Corresponding Members. In the midst of his professional labours in Dublin, he died at the age of 42. His career, if short, was eminently successful, and the works of great practical utility which he executed in South Africa will cause his name to be long and gratefully remembered. Mr. Gamble received the advanced part of his general education at the University of Oxford, which he left, after taking high honours, to prosecute the study of engineering under Sir John Hawkshaw. In 1875 he proceeded to Cape Colony, as he had been appointed by the Government of that dependency head of its newly established Department of Hydraulic Engineering. During his tenure of office, which extended over ten years, he constructed in many parts of the colony large and valuable works for the storage of water for irrigation purposes. In South Africa, where droughts are frequent, works of this nature are an inestimable boon to the colonists. Among the most notable which he executed may be mentioned the reservoir at Brand Vley in Calvinia, irrigation from the Keiskamma River in the King William's Town division, irrigation-works at Tolshok near Beaufort West, and others at Van Wyk's Vley in the Carnarvon division. The last were the most important of all the irrigation-works he undertook in South Africa—the water surface of the reservoir comprising 19 square miles, and the cost of construction (exclusive of land) amounting to about £40,000. Mr. Gamble returned to England in 1886, and was shortly afterwards appointed chief hydraulic engineer to the Government in Ireland. In this capacity he was preparing plans for the improvement

of three great Irish rivers—the Shannon, the Barrow, and the Bann—when death cut short his useful labours. The reports of his operations, which he supplied to the Cape Government, and papers which he contributed to the proceedings of the Institute of Civil Engineers, are all documents of great value.

M'NAIR, WILLIAM.—This distinguished member of the Indian Trigonometrical Survey, in which he had served for twenty-two years, died of typhoid fever at the hill station of Missouri. For the last two years he was engaged in extending a series of triangles from the British frontier at Dera Ghazi Khan across the Suliman Mountains to Quetta. His greatest achievement was his journey in 1883 into Kafiristan, which he made in the disguise of a native doctor, and which gained for him the Murchison Grant of the Royal Geographical Society. On his way he not only penetrated to Chitral by the route of the Swat River and Dir, but crossed the mountains to the west which divide the valley of the Chitral River from that of Arnawai. He visited also the Lut-dih valley, along which there runs a direct and comparatively easy route from Badakshan to Jalalabad. He ascended, besides, to the Dora Pass over the Hindu-Kush Mountains, which he found to be fully 14,000 feet in height, with an ascent which was practicable even for beasts of burden. He returned to India by way of Mastig, Yassin, Gilgit, and Srinagar.

PETERS, KARL.—The report that Dr. Peters and the expedition he was leading to Wadelai had been massacred at Korkoro, in the Masai territory, though questioned at first, has unfortunately been since confirmed. It is now five years since Dr. Peters first brought his name into prominent notice by the leading part he took in promoting, not without detriment to British interests, the cause of German annexation in Eastern Africa. He was the son of a Hanoverian clergyman, and was born at Neuhaus, on the Elbe, in 1856. He studied at Göttingen, Tübingen, and finally at Berlin. After a residence of three years in London, and a tour through the principal states of Europe, he returned to Germany, and founded in Berlin the Society for German Colonization. As the agent of this Society he set out, in 1884, on his first expedition to East Africa, accompanied by Dr. Yühlke and Count Pfeil. Their object was to buy tracts of land on the coast, chiefly in Usagara, with a view to founding a German agricultural and commercial colony in those parts. It was expected by the Society that they would on no account return to Germany without, in some way or another, successfully accomplishing their mission. They arrived in Zanzibar, where they made some hasty preparations for carrying out their designs, the nature of which, however, they were careful not to divulge. On November 12th they quietly left the island for the mainland, and, only seven days later, signed their first treaty with a native chief. They then hastened to other chiefs, and apparently with whirlwind speed; for Dr. Peters, having returned to the coast after little more than a month's absence, stated at Bagamoyo that he had concluded treaties with no fewer than ten independent sultans, who represented the

countries of Useguha, Nguru, Usagara, and Ukami, and had sold to him some 10,000 square miles of territory. Dr. Peters then returned to Berlin and founded the German East Africa Company, to which he ceded the rights that had been acquired by himself and his two colleagues. To this company, as soon as its organisation was completed, the German Government granted a charter and a Letter of Protection which placed its possessions under the German flag. The company began their operations in 1886 by founding stations in the valley of the Kingani; and early in the the following year Dr. Peters, with a working staff of twenty-three persons of various professions, left Germany to help forward the development of the colony. Vitu-land accepted a Protectorate in 1885, and in 1886 the territories which had been previously ceded to the Denhardts were made over to the Company of Dr. Peters, who could thus justly claim the distinction of having been really the prime founder of the German Empire in East Africa. The expedition in which he is supposed to have perished was undertaken ostensibly for the relief of Emin Pasha. The German Government from the first refused all official countenance to this undertaking, which was considered as obviously unnecessary; and Dr. Peters, on arriving at Zanzibar in April last, was forbidden by Captain Wissmann to lead his expedition through German territory. He started for the interior on July 26th, proceeding up the Tana River. By the 8th of September he had arrived within a few days' journey of Masailand: this was a distance of 150 miles from his starting-point. He had expected to reach Emin by the beginning of November.

Strickland, Edward, K.C.B.—Sir Edward Strickland, who spent the closing years of his life in Australia, died suddenly at Sydney on the 18th of July last. He was born in Roscommon in 1821, and was the third son of Gerald E. Strickland, who came of an ancient Westmoreland family which had the same name. He was educated at Stonyhurst College, and in 1840 entered the army in the Commissariat Department. He served in many parts of the world—Australia, Canada, Malta, Kephalonia, the Crimea, New Zealand, and Kaffraria. In 1867 he received the honour of C.B., and twelve years later that of K.C.B. One of his most memorable services was rendered in the course of the Zulu war, when, notwithstanding the greatest possible difficulty of transport, he succeeded in keeping the army properly supplied with provisions. In 1880 he was appointed Commissary-General, and in the year following retired from the service. Geography was a subject in which he took a very special interest, and in his closing years he did much to promote the cause of that science in Australia by encouraging geographical exploration as well as by founding the Geographical Society of Australasia.

Tappenbeck, Hans.—The cause of German exploration in Africa has sustained a loss by the death of Lieutenant Tappenbeck, whose services in opening up the South Congo basin, and afterwards the interior of the Cameroons district, under most trying conditions, place him in the foremost rank of African explorers. In May last, he and Captain Kund were together at the station of Epsumb, which they had

previously founded, between the Upper Njong and the Sannaga rivers. It appears that the Lieutenant, after his companion had left him to return to the coast, undertook an excursion to the north-east, which was fruitful of results. Having passed beyond the Sannaga he reached the country of the Chief N'Giron, by whom he was hospitably received. He found that the natives entertained commercial relations with the Mohammedan Haussa States, which led to the slave-trade and all its attendant horrors. On the 10th of June last Tappenbeck returned to the station at Epsumb, and, proceeding thence to the coast, reached Cameroons on the 12th of July, where he was cut off by a sudden attack of fever on the 31st of the same month.

Woods, J. E. Tenison.—During the past year Australia has lost two of her distinguished public men—the Rev. J. E. Tenison Woods and Sir Edward Strickland, the President of the Royal Geographical Society of Australasia. The former, born near London in 1832, was the son of J. D. Woods, Q.C. The earlier part of his education he received at Newington Grammar School, whence he was transferred to Balliol College, Oxford. As the state of his health obliged him to seek a change of climate, he proceeded to Australia, where from 1857 he was employed in Mission work among the wild tribes who inhabited a part of the country then but little known, the border-land between South Australia and Victoria. His health becoming again impaired, he was forced to desist from all missionary labour. The leisure which he could thus command he devoted to the pursuits of science. As he was known to be an accomplished geologist and naturalist he was repeatedly requested by the Governments and learned societies of Australia to furnish them with reports on the geological structure of the continent, and the best means of developing its natural resources. His scientific explorations, however, were not confined to Australia, but extended to New Guinea, and even to the Malay Peninsula. In the course of these explorations he had many hardships to endure, which had, no doubt, the effect of shortening his useful life. He made many valuable contributions to scientific literature. His greatest work was that entitled, *A History of the Discovery and Exploration of Australia*, which appeared in two volumes, and is now very scarce. He wrote numerous papers for the Royal Society of Australia, as well as for the Linnæan Society of New South Wales, an institution of which he was for some time President. J. W. M'Crindle.

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## PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

The Annual Business Meeting of the Society was held in Dowell's Hall, Edinburgh, on the afternoon of Monday the 25th November last. The Earl of Glasgow, Vice-President, presided.

The Annual Report of Council, which was published last month, having been submitted by the Secretary, was, on the motion of Mr. James Currie, adopted by the Society.

The Annual Elections were then proceeded with.

On the motion of Mr. William C. Smith, advocate, His Grace the Duke of Argyll, K.G., K.T., was elected as President. Mr. William C. Smith, in the course of his remarks, said that the Duke worthily maintained the best traditions of his family, whose name was connected with some of the greatest scenes of Scottish history. His Grace had taken a useful and dignified part in the administration and discussion of public affairs. It was not, however, on these grounds that he proposed the Duke's election to this office. It was because he belonged to the aristocracy of scientific research and intellectual culture. He had set an example of genuine devotion to the truth of nature. In his philosophical writings His Grace had pointed out that the conception of invariable law, which formed the basis of modern science and modern life, was not inconsistent with some reverence for the past and even with the possibility of a religious life for man. As regards positive science, he had worked in many fields which lay quite close to the work of the Society. He had entered into mortal conflict with some of the leaders of the geological schools, and he had contributed an important book on the political geography of Central Asia. He had been the friend of every forward scientific movement in this country. Above all, with all his experience and culture, he had remained essentially and emphatically a Scotsman; and there was no one who could, with greater acceptance or efficiency, fill the chair of President of the Royal Scottish Geographical Society.

The Vice-Presidents were re-elected, and the Right Honourable the Earl of Rosebery, on retiring, by length of service, from the Presidentship, and Dr. John Murray, on retiring by rotation from the Council, were, on the motion of Colonel Dods, elected Vice-Presidents.

Two Honorary Members of the Society were elected: Monsieur Elisée Reclus, on the nomination of Dr. George Smith, and Major J. W. Powell, on the nomination of Professor James Geikie and on the motion of Mr. Ralph Richardson. A record of the services of these two distinguished geographers is given on the next page of the Magazine.

Mr. John Cockburn moved:—"(*a*) That the Honorary Office-Bearers of the Society be re-elected. (*b*) That in the room of Members of Council retiring at this time by rotation, the following gentlemen be elected Members of Council, namely:—Dr. James Burgess, Dr. G. Dods, and Dr. William Russell; and that the following Members of Council retiring by rotation be re-elected, namely:—Mr. D. F. Lowe, General Sir R. Murdoch Smith, Dr. Hugh R. Mill, Mr. J. W. M'Crindle, Mr. W. B. Blaikie, Dr. George R. Merry, Dr. George A. Turner, Mr. John Cockburn, Mr. F. Grant Ogilvie, Sir J. N. Cuthbertson, Mr. William C. Smith, and Mr. James Currie."

The Motion having been adopted by the Society, the Secretary gave formal notice of a motion to be brought forward at a subsequent meeting of the Society, and embodying a resolution of the Council, by virtue of which it is proposed to impose an Entrance Fee on all new Members elected after the completion of the current Session, when the Society will have taken up its new quarters in the National Portrait Gallery, Edinburgh.

The Society then adjourned.

The Anniversary Meeting of the Society was held in the United Presbyterian Synod Hall, Edinburgh, on the evening of Thursday, 28th November last. In the unavoidable absence of the President, the Duke of Argyll, the chair was occupied by Dr. John Murray, Vice-President, who, in his introductory remarks, referred in sympathetic terms to the steady progress made by the Society, both in regard to its membership and its finances, and also to the scientific value of the Society's publications. The Anniversary Address was delivered by General Sir Lewis

Pelly, K.C.B., K.C.S.I., M.P., who took for his subject the various Political Spheres of Influence in Africa. The address is published as our first article this month. General Sir R. Murdoch Smith moved, and Mr. Robert Cox seconded, the vote of thanks to Sir Lewis Pelly. There was no discussion. On the conclusion of the paper, extracts from the letter we publish this month from Mr. Stanley were communicated to the meeting by Dr. George Smith, C.I.E.

On the following evening, Sir Lewis Pelly repeated his Address at the Anniversary Meeting of the Glasgow Branch of the Society in the Hall of the Philosophical Society of Glasgow, whose members also were invited to the meeting. Sir J. N. Cuthbertson presided. The vote of thanks to the lecturer was moved by Dr. Thomas Muir, and seconded by Dr. Christie.

The Society's Branches in Dundee and Aberdeen decided to postpone their Opening Meetings until the return of Mr. Henry M. Stanley, who, it is hoped, will address Meetings of the Society in Edinburgh, Glasgow, Dundee, and Aberdeen.

At a Joint Meeting of the Society's Branch in Glasgow and of the Philosophical Society of Glasgow, held in the Hall of the latter Society, on the evening of 11th December last, Dr. Thomas Muir read a paper on "The Territorial Expansion of the British Empire during the past Ten Years."

The Society held a meeting on the evening of the 18th December last in the Freemasons' Hall, Edinburgh—Professor James Geikie, Vice-President, in the chair —when Mr. H. J. Mackinder, Reader in Geography at Oxford, communicated a paper on "The Physical Basis of Political Geography." On the motion of Mr. W. Scott Dalgleish, a vote of thanks was awarded to the lecturer.

## NEW HONORARY MEMBERS.

At the Annual Business Meeting of the Society, held in Edinburgh on Monday, 25th November last, the following were elected Honorary Members of the Society :—

M. Elisée Reclus, born in France in 1830, educated in Germany, resident in Switzerland, and now at the height of his reputation, has proved himself worthy of the training of Carl Ritter, "the greatest geographer of modern times." After five years of travel in Great Britain and the two Americas, and publishing in Paris many works, and especially *La Terre*, which, in its English dress, passed through several editions, M. Reclus set himself, in 1876, to prepare his *Nouvelle Géographie Universelle: La Terre et les Hommes*. During the past thirteen years the fourteen splendid volumes of that master-work have appeared, covering the whole of the Old World. Of these, five are devoted to Europe, four to Asia, four to Africa, and the latest to the Ocean and Oceania. This work, even in its unfinished state, is a fine illustration of the method of the venerable Carl Ritter, for whom geography included, not only the earth and its products, but its inhabitants and their civilisation. To have been written by one man, the *Géographie Universelle* is wonderfully accurate as well as comprehensive, the facts are brought down to date, and the whole is illustrated by maps and charts on the clearest scale. No language contains such a work, written in a style at once crisp and clear. It is right that its author should be the first scientific Frenchman on the list of the Honorary Members of the Royal Scottish Geographical Society.

Major J. W. Powell, Ph.D., LL.D., has for many years been associated with the geographical and geological exploration of the United States Territories. His account of his exploration of the Colorado River of the West, and its tribu-

taries (1875), and his report on the geology of the Uinta Mountains (1876) brought him great and well-deserved reputation, for they evince not only an admirable knowledge of structural geology, but a remarkably clear perception of its bearings on the origin of orographic features. When Mr. Clarence King retired in 1881 from the Directorship of the newly constituted Geological Survey of the United States, Mr. Powell, then in charge of the Bureau of Ethnology, was elected to the vacant office, which he has since filled to the satisfaction of his countrymen and the great advantage of research. As chief of a national survey, which is geographical as well as geological, Mr. Powell has succeeded in building up a scientific department of which Americans may well be proud. He has attracted to his standard a body of men who, like himself, have made their names known wherever geography and geology are studied; and their reports, bulletins, and monographs are distributed amongst the scientific societies of Europe with a wise generosity, which is in striking contrast to the parsimony of our own Government. Not only on account of his own scientific attainments, but as representative of a great national undertaking which is doing so much for the advance of earth-knowledge, Major Powell is well worthy of the honorary membership of this Society.

## GEOGRAPHICAL NOTES.

### EUROPE.

**Meteorological Observations in Scotland for 1888.**—Dr. Buchan's annual report for 1888, published in *The Journal of the Scottish Meteorological Society*, 1889, concludes with a short summary of the meteorological phenomena of the whole year. Taking the mean quantities, it appears that the barometric pressure was 0·044 inch higher than the average during the last thirty-two years, and higher than that of any year since 1880, except 1887. The monthly range of the barometer was less by 0·109 inch, and less than it was in any year since 1879. The mean temperature was 1 degree below the average. It was still lower in 1885 and 1886, but higher in 1887. The monthly range differed little from the average. The relative humidity was slightly less, and the total rainfall 2½ inches less. The total number of hours of sunshine was also smaller.

**Proposed Ship-Canal between the Forth and Clyde.**—Messrs. D. and T. Stevenson, of Edinburgh, have recently put forward a scheme for the construction of a ship-canal to connect the Clyde and the Forth, whereby ships would avoid the dangerous passage through the Pentland Firth, and the route from ports on the North Sea to the west would be considerably shortened. The existence of two canals—the Forth and Clyde from Grangemouth to Bowling, and the Caledonian—is a sign, they maintain, of the desirability of such a canal. But these canals no longer satisfy the demands of the present day. Even the Caledonian, being able to admit vessels of about 160 feet in length, 38 feet beam, and 17 feet draught only, is too small, even if it were not also too far to the north. The first route which suggested itself to the engineers was that of the present Forth and Clyde Canal; but it was rejected, because the canal would be elevated never less than 160 feet above the level of the sea for a distance of about thirteen miles, and the locks that would be necessary would cause great delay in the passage of vessels. They therefore examined another route, which they can unhesitatingly recommend. From Alloa westwards to within seven or eight miles of Loch Lomond the surface

of the land is only 30 to 50 feet above the level of the sea. After this the ground rises, so that a tunnel would be necessary near Loch Lomond. There is a choice of three outlets from the loch to the sea: (1) from Tarbet to Loch Long, (2) from the southern extremity of the loch through the Vale of Leven to Dumbarton, (3) from near Arden to a point northward of Ardmore Head. The eastern entrance to the canal would be made about a mile above Alloa, and an approach formed either by deepening the Forth up to this point or by making a cutting inland to a depth of 25 feet at low-water spring tides, which would give a depth of 38 feet at neap tides; so that the largest vessels afloat would always be able to enter the canal at high tide. The proposed dimensions of the canal are 30 feet in depth, and 72 feet wide at the bottom (like the Suez Canal), with side-slopes depending on the nature of the ground. The locks should be 600 feet long and 80 wide, with smaller ones alongside for the passage of smaller vessels. As the level of the water in the canal would be only 13 feet above high tide, only one lock would be required at high-water, but at other times two might be necessary. Some diversions of the river Forth would be necessary, but would involve no difficulties. The tunnel near Loch Lomond, $2\frac{1}{4}$ miles in length, would pass through old red sandstone, and be 102 feet in width at the water-line, and 150 feet in height above the surface of the water. It might, if considered advisable, be converted into an open cutting. The distance from where the deepening of the Forth begins to the locks would be $10\frac{1}{2}$ miles, and thence to Loch Lomond 25 miles. Of the three routes from Loch Lomond, that by Tarbet is the longest, the distance from the tunnel to Tarbet being 14, and along Loch Long 15, miles; but the cutting between the lakes would be only $2\frac{3}{4}$ miles in length, whereas, though the distance across the loch to Arden is only 5 miles, the canal to the Clyde would be $5\frac{1}{2}$ miles, partly through a tunnel. The Dumbarton route has the disadvantage of debouching into the river Clyde, where there is danger of grounding, and where large vessels would often be unable to pass, seeing that the depth at low-water is only 15 to 18 feet, and even at high-water spring tides only 25 to 28 feet. By the Loch Long route vessels of 30 feet draught could pass to the sea at any time. Loch Lomond, being about 22 feet above the mean sea-level, and having an area of 21,000 acres, would form an inexhaustible reservoir for supplying the locks with water. One great advantage of this route is that only one lock at each end of the canal would be required. Of course the plan as proposed by Messrs. Stevenson is only in rough outline, and many modifications might be found necessary after a more minute investigation.

The distance saved between the Clyde and ports on the east of Great Britain and the north-west of Europe would be 238 to 529 miles; from the Forth to Ireland, the Mediterranean, and America, 141 to 487. The cost of the canal is estimated roughly at £8,000,000, and the expenses of maintenance and management at £60,000 per annum. Messrs. Stevenson expect that about 9,516,650 tons of shipping would make use of this canal, which, at the rate of 1s. 6d. per ton, would yield a revenue of £713,748; so that, after deduction of the annual expenses, a net revenue would remain sufficient to pay 8 per cent. on the capital; and the traffic would probably increase every year.

**The Temperature of the Surface of the Sea on the East Coast of Scotland.**—In an article in the *Journal of the Scottish Meteorological Society*, Third Series, No. vi., Mr. H. N. Dickson, F.R.S.E., has published a number of tables relating to this subject, and has given a summary of the conclusions derived from the observations therein recorded. These observations have been made at coastguard stations, and by fishermen, and elsewhere. They show that the mean annual temperature of the surface of the sea is 47·2° F., except to the south of the Firth of Forth, where it is

47·8° F. The temperature does not fall as the latitude increases, for the means for Burntisland and Wick are the same, and at intermediate stations the difference never exceeds 0·4° F. To the west of the Orkneys and in the Shetlands, the mean is over 48° F. On comparing these tables with those of the mean air-temperature, calculated from observations taken at fifteen of the northern lighthouses during ten years, it is seen that the mean temperature of the sea is always in excess of the air, except on the Aberdeenshire coast. Means calculated for periods of ten days show that places under the influence of the land temperature, owing to the water being shallow or landlocked, have two annual maxima—the first at the end of July, and the second between the 11th and 20th of August. Such is the case in Moray Firth and the Firth of Forth. Between Helmsdale and Wick, and also between Peterhead and Stonehaven, the maximum temperature is 1° to 3° F. lower than elsewhere, and the curves representing the temperatures of these places are flatter, that is, the changes of temperature are less abrupt. The cold region off the Aberdeenshire coast does not extend more than about 30 miles from land. Mr. Dickson ascribes the existence of these cold areas to the action of the winds, which on the parts referred to blow generally from the west, veering sometimes to the south, and sweep away the surface water, thus causing the colder water underneath to well up. Elsewhere the winds blow off shore, owing to the trend of the latter, or the water is too shallow to allow of upwelling, so that the said effect is not produced.

**Iceland.**—Herr T. Thoroddsen was in the summer of 1889 travelling in Iceland, and has given an account of his discoveries in *Petermann's Mitteilungen*, Bd. 35, No. xi. The part of the island he visited lies on the western edge of Vatna Jökull, to the north-east of Hecla. A great part of this country has never been visited by any one, for the total absence of grass for horses renders travelling difficult. All the lower slopes of Torfa Jökull are covered with lava and ashes, but the substratum and the ridge itself are composed of palagonite breccia and tuff. The large river Tungnaa approaches much nearer to Torfa Jökull than it is drawn on maps. Crossing this river, Herr Thoroddsen took up his quarters by the Fiskivötn, and made several excursions in the neighbourhood. The lakes abound in trout; they are small, and are represented on the maps on too large a scale. They are not surrounded by glacial *débris*, but are almost all crater lakes. Across an extensive tract of lava, totally devoid of grass, lies the Thorisvatn, which is not a very small lake as represented on Gunnlaugsson's map, but one of the largest in the island, and not much less than Thingvallavatn. The lakes are generally enclosed by steep mountains, so that it is difficult to approach them. It has been supposed that the rivers Skapta, Hversfisfljót, and Tungnaa rise at the same place from a glacier, and they are so represented on Gunnlaugsson's map; but Herr Thoroddsen found that the Tungnaa flows in two branches from a large glacier, the edge of which extends in a long curve from the mountains south of Vonarskard to those near Fljotshverfi; that the source of the Skapta lies about 9 miles further south; and that the Hversfisfljót rises 10 to 14 miles still more to the south. Three serrated ridges run between the Tungnaa and Skapta, from the Vatna Jökull to the Torfa Jökull. These mountains are composed entirely of palagonite breccia, and the valleys are filled with volcanic ashes and shifting sands. Between the middle and southern ridges lies a lake, about 23 miles long, which stretches nearly to the foot of Vatna Jökull, and, though in most places very narrow, is one of the largest in Iceland. It is fed with milky water by numerous glaciers. Near the last of these Herr Thoroddsen on his way to the Torfa Jökull visited several warm springs and solfataras.

## ASIA.

**Asia Minor.**—The remark made at a recent meeting of the Royal Geographical Society by the president, *à propos* of certain explorations by Mr. Theodore Bent, viz., that there is still much work for the competent observer in regions where practically no risk need be encountered, is strikingly exemplified in the account of the last voyage of that accomplished explorer along the south coast of Asia Minor, as described in the *Journal of Hellenic Studies*. Sailing along the Carian coast, he landed in the bay of Aplotheka, at the ancient town of Loryma; and hearing there of some ruins a few hours distant, he rowed to the place, and discovered a curious little harbour with the entrance not a stone's-throw in width. Thence an hour's walk brought him to some extensive ruins, which, from an inscription, he believed himself able to identify with tolerable certainty as Kasarea. The village of Phœnike being just beyond, he could also identify with certainty the little harbour as the κρῆσα λιμήν of Ptolemy, for this harbour lies, according to that geographer, between Loryma and Phœnike. Pliny also mentions that *Portus Cressa* lies just opposite Rhodes at a distance of twenty miles, which agrees with the position. Again, a little further along the coast, on the Gulf of Makri, Mr. Bent was able, from inscriptions on the ruins, to identify the site of a Lycian town of some importance—Lydæ, the capital of a district known as Lydatis. A little further on, an old Hellenic acropolis surrounded by a few tombs seemed, from some half-defaced inscriptions, to have been known as Lissa, though the site seems to be that assigned by Ptolemy to the town of Karya. Some of the inscriptions found in these places —they have been edited and commented on in the *Journal* by Canon Hicks—are of considerable interest, and the remains are described by Mr. Bent to be not without artistic merit. The whole region is now inhabited only by nomad tribes of Yuruts; and we merely allude to these discoveries to show how much more may be done and discovered by the explorer, within easy reach of home, than is commonly supposed. Indeed, to quote Mr. Bent's words with reference to this district alone, "Inasmuch as Pliny tells us that there were once seventy cities in Lycia, and in his time thirty-six, of which he only knew the names of twenty-five, there is room for much more geographical discovery in this interesting district."

**Expeditions in Asia.**—Two new expeditions are announced in *Globus*, Bd. 65, No. xiv. Joseph Martin has lately left Pekin with a few companions for Lan-chow and Sin-ning, with the intention of reaching Tibet by the country of the Kuku Nor. The journey is undertaken for the purpose of geological and physical geographical investigations. This traveller is famous for his great journey in Eastern Siberia, and, in particular, for his ascent of the Stanovoi Mountains.

The well-known French traveller, Bonvalot, accompanied by Prince Henry of Orleans, has commenced a new journey in Asia, the aim of which is nothing less than to traverse the continent from north-west to south-east. The expedition is to proceed from Omsk through Semipalatinsk to Chuguchak on the Chinese frontier, then by Manas, Urumtsi, Karashar, Korla, the Lob Nor, Chamuen-Tai, Kukusai on the upper Yang-tsi-kiang, Tsiamdo, Batang, and Yunnan to the coast at Tong-king. M. Bonvalot is, however, quite aware that his plan may very probably have to be considerably modified.

**Naphtha Springs at Baku.**—*Deutsche Rundschau*, Bd. 12, Heft iii., contradicts on official authority the report that the wells at Baku are beginning to fail. The yield in 1888 was nearly 2843 tons of raw naphtha, about 15·1 per cent. more than in the preceding year; while up to August 1st, 1889, the quantity obtained was 57½ tons

more than during the same period of 1888. The rise in price is due to the increased number of distilleries owing to the ever-increasing demand for the residuary products. The 240 or 250 borings now working are insufficient; 150 more might be added with advantage.

**Discovery of Petroleum in Saghalien.**—In the summer of 1887 Herr Lindenbaum found a petroleum lake on a narrow tongue of land in the north of Saghalien. It is about 22 miles north-east of a village named Pomor, and at about 54° N. lat. A little south of Pomor lies Baikal Bay, a good harbour, which has a depth of eight feet at low tide, and could therefore be entered by small vessels. There would be no difficulty in making a road from this place to the petroleum lake. There is also another spot, 125 miles south of the former, where petroleum is said to occur.—*Globus*, Bd. 56, No. xvii.

## AFRICA.

**Portuguese Claims on the Zambezi.**—The following despatch has been addressed by the Marquis of Salisbury, K.G., Her Majesty's Principal Secretary of State for Foreign Affairs, to George Glynn Petre, Esq., C.B., Her Majesty's Envoy Extraordinary and Minister Plenipotentiary to the Court of Lisbon, instructing him to protest against the Portuguese Royal Decree of November 9, 1889 :—

FOREIGN OFFICE, Nov. 21, 1889.

SIR,—In your despatch of the 16th inst. I received a copy of the following Royal Decree which was published in the official *Gazette* of the 9th inst. It purports to place a large territory under Portuguese administration in the interior of Africa to the north and south of the Zambesi river. The district, to which the name of Zumbo is given, appears to comprise a great part of Mashonaland and an immense tract to the northward, approaching the frontiers of the Congo Free State and the watershed of Lake Nyassa. I enclose a map indicating the frontiers set forth in that decree.

I have to request you to remind the Portuguese Government that Mashonaland is under British influence, and to state that Her Majesty's Government do not recognise a claim of Portugal to any portion of that territory. The agreement between Lobengula and Great Britain of the 11th of February 1888 was duly notified to them in accordance with the instruction given by me to Sir George Bonham in my despatch of the 24th of July of that year. It was also officially published in the Cape Colony. The agreement recorded the fact that Lobengula is ruler of Mashonaland and Makalakaland.

Her Majesty's Government are also unable to recognise the claims of Portugal to the territory to the north of the Zambesi indicated in the above-mentioned proclamation. So far as they are defined, they follow the course of the Loangwa river, on whose banks there are tribes with whom Her Majesty's Government have treaties; and they appear to be inconsistent with British rights established by settlement upon the Shiré river and the coasts of Lake Nyassa. Beyond this they assert the jurisdiction of Portugal over vast tracts which are still unoccupied, but the knowledge of which is principally due to British explorers. You will refer Senhor Barros Gomes to the memorandum which you placed in his hands, by my direction, on the 13th of August 1887, in which it was stated that Her Majesty's Government protested against any claims in no degree founded on occupation, and that they could not recognise the sovereignty of Portugal in territory of which she was represented by no authority capable of exercising the ordinary rights of sovereignty. You will formally renew this protest.

You will inform His Excellency that Her Majesty's Government recognise on the Upper Zambesi the existence of Portuguese occupation at Tete and Zumbo, but that they have no knowledge of the occupation of any other place or district.

You will place a copy of this despatch at once in the hands of Senhor Barros Gomes.—I am, etc., SALISBURY.

George Glynn Petre, Esq., C.B.

*From the London Gazette, Nov.* 26, 1889.

**The Cameroons.**—Capt. A. Kund last July read a paper on his travels in the Cameroons before the Geographical Society of Berlin, which is published in the *Verhandlungen* Bd. 16. No. vii.) The geographical features of this, the southern, part of the Cameroons territory has been described generally in the *Scottish Geographical Magazine*, vol. iv. p. 553. Capt. Kund's present paper furnishes a few ethnographical data. Between the Sannaga and the Njong rivers the coast is uninhabited, but the region of primeval forest stretching inland from the coast range, and the range itself, is peopled more or less densely by the Mwelle (Bakoko); south of the Njong, Banoko and Bapuko (Batanga) live on the coast, and beyond these there are a few settlements of Kasyua, or, as the Batanga call them, Mabea. Still further inland dwell a people of short stature, who hide themselves in the recesses of the forest, and appear in the neighbouring villages at rare intervals to exchange the products of the chase for powder and rifles. The breadth of the inhabited strip of coast land is nowhere more than nine or ten miles. The forest extends to a distance of about 120 miles from the coast, and includes the coast range, which, beyond, passes into a plateau thickly peopled by various tribes, probably akin to the Fans. North of the Sannaga are found the dwelling of the Sudan Negroes, as Capt. Kund calls them to distinguish them, from the Bantu Negroes. This people most probably extends to the Benué. On the Sannaga the explorers found European articles which had been brought by Mohammedan Haussa traders from the north. The forest region, which extends from the plateau above-mentioned to the basins of the Congo and the Welle, seems to separate not only different races of men but also the dry grassy land on the north from the damp forest land to the south. Capt. Kund found the natives of the plateau tall, well-built men, light-hearted and simple-minded. The men wore a piece of bark-cloth and the women those singular tails fashionable among several of the Bantu tribes.

## MISCELLANEOUS.

The first sod of the **Nicaragua Ship Canal** was turned at San Juan del Norte on October 22d, 1889.

According to *Deutsche Rundschau*, Bd. 12, Heft iii., Russia has occupied **Deer Island**, which belongs to **Corea**, with the intention of making it a coaling and naval station.

A society called the **Stanley Society** has been formed at the Martha Institute, Hoboken, U.S.A., to arouse public interest in African affairs by collecting volumes and publications, and discussing questions relating to that continent.

We have received from Dresden a copy of *Litteratur der Landes- und Volkskunde des Konigreichs Sachsen*. It is a catalogue of books relating to the history, scenery, agriculture, manufactures, etc., of the **Kingdom of Saxony**, compiled by Dr. Emil Richter, librarian of the Royal Dresden Library, and issued by the Verein für Erdkunde, in honour of the eight-hundredth year of the rule of the House of Wettin.

The *Bulletin of the Museum of Comparative Zoology*, Harvard College, is publishing the results of the dredgings undertaken by Prof. Alex. Agassiz in the **Gulf of Mexico** and in the **Caribbean Sea**. The volume for June 1889 forms the second part of the reports on the *Mollusca*, and is devoted to *Gastropoda* and *Scaphopoda*. It is not merely a list of the specimens obtained and the places where they were found, but it gives also a full description of many organisms, and is illustrated by numerous plates.

A bloodless revolution in Rio Janeiro last November overturned the monarchy in **Brazil**, and a Provisional Government has been established in its place to carry on the affairs of the country until a republican constitution can be drawn up. A proclamation has been issued at Rio Janeiro announcing that the provinces of Brazil are to form a federal republic with the designation of the United States of Brazil. Each state is to form a local government, and send a representative to Congress, which is soon to be convened.

We have received *Les Origines de la Cartographie de l'Europe Septentrionale*, by Dr. E. T. Hamy, a reprint from the *Bulletin de Géographie historique et scientifique*. The author describes the changes in the **Cartography of Europe** from the old Italian and Catalonian maps of the thirteenth century down to the second half of the sixteenth century, when Mercator by his improvements commenced a new era in this art. A considerable space is devoted to identifying rivers, towns, etc., marked under various names in the old maps. Three or four of these maps are reproduced. It is a valuable monograph.

An expedition under Mr. J. E. M'Grath has been sent out by the United States Coast and Geodetic Survey to put an end to the uncertainty which at present prevails as to the exact course of the **Boundary of Alaska**, or frontier between Alaska and the British Possessions. The principal task of the expedition will be to determine as many points as possible where streams cross the 141st meridian, which is to form the boundary from the neighbourhood of Mt. St. Elias to the Arctic Ocean. The settlement of the frontier on the watershed is to form the subject of a later agreement with Canada.—*Petermann's Mitteilungen*, Bd. 35, No. x.

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## NEW BOOKS.

*Russia in Central Asia in* 1889, *and the Anglo-Russian Question.* By the Hon. George N. Curzon, M.P. With Appendices, Maps, Illustrations, and an Index. London: Longmans, Green, and Co. *Price* 21*s.*

Mr. Curzon's volume is substantial and circumstantial evidence of the changed conditions of authorship and travel in Central Asia. It is the record of a journey which lasted only a few months; but it covers ground which not so long ago it would have taken years to traverse. Now that the Trans-Caspian Railway is open to Bokhara and Samarkand, the modern tourist can smile in the same superior way at the traveller who ten or twenty years ago made his will before braving the perils of the Khanates, as at our ancestors at the beginning of the century, who took the same precaution before trusting the stage-coach to London. Though Mr. Curzon's book be the impressions gathered on a railway journey of a state of things which is undergoing constant and bewildering change, his pictures of Turkomania and Bokhara under the Russians in 1889 are full of detail. He has also caught and

photographed the scene at an important moment—immediately after the opening of the extension beyond the Oxus of General Annenkoff's new line, by which Russia believes that she has strengthened her strategical, political, and commercial hold on Central Asia and the approaches to India. However rapid subsequent transformations may be, it will always be interesting to look back at the aspect presented by the old seats of Mohammedan power in the East, at the time when the locomotive first steamed past Merv and over the Oxus, and brought up outside the gates of Bokhara, and when it became possible to set foot in Samarkand, ten days after leaving St. Petersburg.

The people of Central Asia appear to be reconciling themselves with much promptitude to the new means of intercourse and the new masters. By illustration and description, Mr. Curzon succeeds in making clear the enormous difficulties encountered on the first sections of the Trans-Caspian Railway, particularly in keeping the line clear of the shifting sands and in obtaining supplies of fuel. These problems have not yet been satisfactorily solved, and it is probable that the present Caspian terminus of the line at Usan Ada will not be the permanent one. Possibly continuous railway communication may be sought through the Persian provinces on the Caspian, the commercial and political control of which has already been practically secured by the railway. Military and trade considerations also demand a completion of the scheme by a line through the passes of the Caucasus connecting the European and Central Asian Railway systems. Whether the future will see further developments, in the shape of the junction through Tashkent of the proposed Siberian railways with that which has its terminus at Samarkand, or of an extension of the Trans-Caspian line through Herat to meet the Indian railway system, are among the points discussed by Mr. Curzon. They involve financial, engineering, political, and strategical questions of such magnitude and intricacy, and depend upon so many unknown eventualities, that an opinion upon the subject in the present state of our knowledge cannot be of very great value. It may be noted, however, that Mr. Curzon, after reviewing the grave objections to forming a junction between the Indian and Russian railways, expresses an earnest hope "that no support will be given to a project so fantastic in itself, and likely to be so dangerous to the empire." Still, when we find him speculating on the probability that "many now living will see a railway station at Herat in their time," and remarking that "the physical obstacles to a through line are *nil*," strong doubts will arise whether, in spite of being dangerous and fantastic, a Russo-Indian railway is not bound to become some time or other an accomplished fact. The author takes a very serious view of the extent to which our prestige, influence, and commercial interests in Persia are likely to suffer through Russian enterprise on the northern frontier, and warns this country to take measures in time, lest the dominating tendency and political influence which we possess in the southern portion of the Shah's dominions be not also jeopardised. Bokhara he looks upon as already completely subjected to Russian power as the Nizam's dominions are to that of Britain. The mystery that till lately hung over "Bokhara the Noble," like that which enshrouded Merv, appears to have completely disappeared. Mr. Curzon was unable even to see many signs of the fierce fanaticism with which the Bokhariots have been credited by pre-railway visitors. At first their attitude towards the locomotive engine was one of suspicion. "It was regarded as foreign, subversive, anti-national, and even Satanic. Shatan's Arba, or the Devil's Wagon, was what they called it." But with familiarity "apprehension gave way to ecstasy." The volume is admirably illustrated, and is provided with a good map and index. It may reckon as one of the most interesting books on Central Asia that has appeared since Mr. Schuyler's *Turkistan*.

*Among Cannibals: An Account of Four Years' Travel in Australia, and of Camp Life with the Aborigines of Queensland.* By Carl Lumholtz, M.A., Member of the Royal Society of Sciences of Norway. With Maps, Coloured Plates, and 122 Illustrations. Pp. xx and 395. London: John Murray. *Price* 24*s.*

The journeys here recorded were undertaken partly at the instance of the University of Christiania, with a view both to anthropological investigations and the collection of zoological specimens for their museum.

After paying short visits to Adelaide, Melbourne, and Sydney, Mr. Lumholtz proceeded to Rockhampton in Queensland, from which point he penetrated some 700 miles into the interior, when he was driven back by illness, and partly, too, we gather, deterred from going further by the poverty of the country as a field for zoological investigation. He notes, we may observe, a marked difference in the character of the fauna, and in the appearance of the country generally, after passing the so-called Dividing Range, a mountainous tract of considerable width, which at a distance averaging some 100 to 200 miles extends from north to south of the continent parallel with the eastern coasts. To the westward of this lie the great sheep-farms of Western Queensland, and there is a great extent of deep rich soil which will be available in the future if water can be supplied, as seems probable, from artesian wells, for wheat-growing on a large scale. The mineral wealth in the district of the Diamantina River (S. lat. 21°-22°, and E. long. 142°-143°), still lying undeveloped for want of transit, is also great.

Mr. Lumholtz's chief explorations, however, deal with a tract some six degrees to the north, and bordering on the Herbert River, in about 18° N. The mountains, which here intercept the monsoons and bring down a good deal of rain, are clothed with a dense forest vegetation of a tropical character, very different from that of the eucalyptus region to the southward, interspersed, however, with a certain amount of grass land. Here are still found a number of small and mutually hostile tribes who have as yet come but little in contact with the white man, and accordingly offer a most interesting field for anthropological study. The difficulty was to gain their confidence sufficiently to be allowed to live and go about freely among them, for a stranger and an enemy are alike *hostis*, and the white man's treatment of their race (of which Mr. Lumholtz has much that is disgraceful to tell) is only too well known to them. His account of the life which he followed, living for several months at a time the life of the natives themselves, is very curious. When opportunity offers, he says, they are cannibals, with the excuse at all events of a very insufficient natural supply of food, for the animals are few and scarce, and their means of catching them small. Wild honey and the larvæ of insects form a large share of their diet, the latter, according to Mr. Lumholtz, being very good.

The extent to which the race is mixed with a Papuan element is evident from the fact he notes, viz., that with the exception of about 5 per cent. all the population has curly hair, and we venture to think that this element may be more extensively prevalent than is commonly supposed.

He gives many curious traits of character and customs which could only be learned by living in close intercourse, and by some one fairly familiar with the language. A meeting for dances and singing lasted for some weeks, but no other could take place for some time, as the same songs and dances must not be repeated, and to produce new ones is a tax which the native intellect cannot support often. They are suspicious as well as timid, and he thinks treacherous, so that he occasionally kept awake at night; and he noticed the slowness with which after awaking their full intelligence returned. Their existence during the day, he says, is happy enough, but after dark they are a prey to terrors, not necessarily ill-founded, as they are

constantly expecting hostile attacks from their neighbours. Their beliefs and superstitions, their views as to disease and its treatment, etc., as far as the author could ascertain them, do not differ from those of other savages. Joy is shown, as in New Zealand, by floods of tears, and even by lacerating the skin.

He has some interesting notes on the boomerang, which may have been suggested, he thinks, either by a piece of naturally dried wood accidentally used as a missile or a toy, or more probably by the leaf (a phyllode no doubt) of an acacia, or even by the spiral flight of a winged seed.

Among his discoveries are three new opossums (*Pseudochirus*) and a dendrolagus or tree-kangaroo, slightly different from that of New Guinea. These are well represented by coloured drawings.

We have probably said enough to show that the book contains a good deal of interesting and original information ; and it is pleasantly written besides.

*The Land of an African Sultan: Travels in Morocco*, 1887, 1888 *and* 1889. By Walter B. Harris, F.R.G.S. (Al-Aissoui). With Illustrations. London : Sampson Low, Marston, Searle, and Rivington, Limited, 1889. Pp. 338. *Price* 10*s.* 6*d.*

In spite of the jealous exclusiveness of the Sultan and his officials, and the risks of travel from bands of robbers and marauders, and the religious fanaticism of the natives, Marocco continues to attract European travellers. Apart from the spice of adventure and danger associated with travel in that country, there is another and more potent attraction to many Europeans, especially to gentlemen from these islands. It affords good sport to the rifle ; game exists in several varieties, and in most parts in fairly satisfactory quantity. The advantages which Marocco offers to the sportsman are not obscured by Mr. Harris.

The book consists of four parts. The first is headed "A Journey through Northern Morocco," and describes a journey made from Tangier by way of Laraiche to Mequinez and Fez, and home again to Tangier *vid* Wazan. The second part is a narrative of a "Journey with H.B.M. Special Mission to the Court of the Sultan at Morocco City," in the year 1888, including a trip to the Atlas Mountains and a chapter on the coast towns of Marocco. The third part is entitled "A Visit to Wazan : My Ride to Sheshouan ;" and the last is "About the Moors." The spirit and treatment of the book can be best described in the author's own words :—"This is not supposed to be a book on Morocco, but an account of my travels, extending over many happy months spent in that country. . . I have striven to give my book as much reality as I can ; I have tried to tell to the best of my ability what I consider most characteristic of the country by sketching out everyday life there. Nor does this book purpose to be a book of exploration. My travels in Morocco have always been undertaken merely for pleasure and sport." Nevertheless, as the author goes on to particularise, the element of exploration is not altogether absent. The visit to Sheshouan—a town that had only once previously, so far as is known, been visited by a European, was original work ; and the narrative in which it is described is delightful reading : the journey was adventurous in the extreme, and is full of sensational interest. Nor does the chapter on the visit to Wazan yield to it in point of interest. The Shereef or ruler of the town, a direct descendant of Mohammed the Prophet, having conceived a warm friendship for Mr. Harris, put every facility in his way, so that he enjoyed exceptional advantages for the study of the private and social life of the Moors in the interior, in places where they have not yet become contaminated by intercourse with Europeans. And this is beyond question the strong feature of the book : its descriptions of the picturesque native life and native manners. But the best qualities of Mr. Harris's writing must be attributed to the good spirits of the

author, to his freshness, his sympathy, and yet more than these, to his humour and fund of anecdote. The reader is often compelled to laugh in spite of himself. Of the anecdotes, the gem is the one about the benevolent old gentleman who preached to the Moors in Tangier (pp. 15-16), which we will not spoil by repeating. Others almost as good occur on pp. 155, 256-258, 297. That which makes the humour so enjoyable is that it is never forced, except perhaps at most in a couple of passages. The curious reader who is in search of information about leprosy, or the troglodyte caves, will find something to interest him at pp. 177, 223-224, and 328, for the disease, and at pp. 243 *et seq.* for the abodes of the cave-dwellers. It may be remarked that Mr. Harris substantially agrees with Mr. Joseph Thomson (whose well-known visit to the Atlas glens was preceded by one made by Mr. Harris in the same quarter only about a month previously) in his estimate of the Government and the tremendous weight of its oppression on the native population. The author's remarks on the ill-advisedness of attempts to graft Christianity, as at present conventionally practised, upon the perfervid religious sentiment of a Mohammedan people like the Moors, are likely to raise criticism. Respecting many of the towns he visited, Mr. Harris has, of course, little that is new to tell the scientific geographer or student of Marocco and its people. Yet there are few, we believe, but will read for the first time of the strange fakir-like sects of the Aissoui and Hamdouchi of Mequinez. A great deal of the confidence that the author inspired amongst the people was due, he says, to the fact that he carried about with him some tame snakes. Hence his nickname Al-Assoui, which signifies a follower of Sidi ben Aissa, the patron saint of snake-charmers. Altogether, we personally owe Mr. Harris a debt of gratitude for some hours of very enjoyable reading.

The work for which the publishers are responsible—printing, binding, and general get-up—is quite satisfactory. The book has a useful map, though, as is so often the case, its orthography does not quite agree with that of the text of the book. The illustrations are for the most part instructive and spirited in execution.

*David Livingstone: His Labours and his Legacy.* By ARTHUR MONTEFIORE, F.R.G.S. London: George Partridge and Co. N.D. Illustrated. Pp. 160. *Price* 1*s.* 6*d.*

The author has produced a very readable, concise, and fairly accurate account of Livingstone's work in Africa. Livingstone's legacy is, of course, the extension of the mission field in Africa, and the suppression of the slave-trade, and in regard to these matters Mr. Montefiore concludes his book with a few sensible remarks. The coarse type-map accompanying the volume is useless for reference; the illustrations are, however, good, though some appear to be old friends.

*A General Formula for the Uniform Flow of Water in Rivers and other Channels.* By E. GANGUILLET and W. R. KUTTER. Translated from the German (with data in English Measure), by RUDOLPH HERING and JOHN C. TRANTWINE, Jr. London: Macmillan and Co., 1889. Pp. xxiii + 240.

This collection of hydraulic tables has stood the test of long experience in Switzerland, where the physical conditions of the country make a thorough knowledge of the flow of its turbulent streams a matter of the utmost importance. The formula arrived at, although avowedly empirical, is general in so far as it has been demonstrated to apply to all known cases. Before the geographer benefits by this relation of the slope of a river-bed to the velocity of its water, the engineer must translate the general formula into actual figures for each particular case. It is to engineers and to practical students of hydrography that the book appeals, and to all such in English-speaking countries it must prove welcome.

*From a Negative by George Shaw, Viewpark, Edinburgh.*

Alfred H. Hill

# THE SCOTTISH GEOGRAPHICAL MAGAZINE.

## THE EVOLUTION OF CLIMATE.[1]

By Professor James Geikie, LL.D., D.C.L., F.R.S.

*(With Maps.)*

One of the most interesting questions with which geological science has to deal is that of the evolution of climate. Although there is no general agreement as to how former climatic fluctuations came about, yet the prevalent opinion is that in the past, just as in the present, the character of the climate must have depended mainly on latitude and the relative position of the great land- and water-areas. This was the doctrine taught by Lyell, and its cogency none will venture to dispute. It is true he postulated a total redistribution of oceans and continents—a view which the progress of science has shown to be untenable. We can no longer speculate with him on the possibility of all the great land-areas having been grouped at one time round the equator, and at some other period about the poles. On the contrary, the evidence goes to show that the continents have never changed places with the ocean—that the dominant features of the earth's crust are of primeval antiquity, and antedate the oldest of the fossiliferous formations. The whole question of climatic changes, therefore, must be reconsidered from the point of view of the modern doctrine of the permanency of continental and oceanic areas.

But before proceeding to this discussion, it may be well to glance for a moment at the evidence from which it has been inferred that the climate of the world has varied. Among the chief proofs of climatic fluctuations are the nature and distribution of former floras and faunas. It is true, fossils are, for the most part, relics of extinct forms, and we cannot assert of any one of these that its environment must have

[1] An Address delivered before the Royal Physical Society at the opening of the Session 1889-90.

been the same as that of some analogous living type. But, although we can base no argument on individual extinct forms, it does not follow that we are precluded from judging of the conditions under which a whole suite of extinct organisms may have lived. Doubtless, we can only reason from the analogy of the present; but, when we take into account all the forms met with in some particular geological system, we seem justified in drawing certain conclusions as to the conditions under which they flourished. Thus, should we encounter in some great series of strata many reef-building corals, associated with large cephalopods and the remains of tree-ferns and cycads, which last from their perfect state of preservation could not have drifted far before they became buried in sediment, we should surely be entitled to conclude that the strata in question had been deposited in the waters of a genial sea, and that the neighbouring land likewise enjoyed a warm climate. Again, should a certain system, characterised by the presence of some particular and well-marked flora and fauna, be encountered not only in sub-tropical and temperate latitudes but also far within the Arctic Circle, we should infer that such a flora and fauna lived under climatic conditions of a very different kind from any that now exist. The very presence, in the far north, of fossils having such a geographical distribution, would show that the temperature of polar seas and lands could not have been less than temperate. When such broad methods of interpretation are applied to the problems suggested by former floras and faunas, we seem compelled to conclude that the conditions which determined the distribution of life in bygone ages must have been, upon the whole, more uniform and equable than they are now. It is unnecessary that I should go into detailed proof; but I may refer, by way of illustration, to what is known of the Silurian and Carboniferous fossils of the Arctic regions. Most of these occur also in the temperate latitudes of North America and Europe, while many are recognised as distinctive types of the same strata nearly all the world over. As showing how strongly the former broad distribution of life-forms is contrasted with their present restricted range, Professor Heilprin has cited the Brachiopoda. Taking existing species and varieties as being 135 in number, he remarks that "there is scarcely a single species which can be said to be strictly cosmopolitan in its range, although not a few are very widely distributed; and, if we except boreal and hyperboreal forms, but a very limited number whose range embraces opposite sides of the same ocean. On the other hand, if we accept the data furnished by Richthofen concerning the Chinese Brachiopoda, we find that out of a total of thirteen Silurian and twenty-four Devonian species, no less than ten of the former and sixteen of the latter recur in the equivalent deposits of Western Europe: and, further, that the Devonian species furnish eleven, or nearly 50 per cent. of the entire number, which are cosmopolitan or nearly so. Again, of the twenty-five Carboniferous species, North America holds fully fifteen, or 60 per cent., and a very nearly equal number are cosmopolitan." The same palæontologist reminds us that by far the greater number of fossils which occur in the Palæozoic strata of Australia are present also in regions lying well within the limits of the north temperate zone. "In fact," he continues,

"the relationship between this southern fauna and the faunas of Europe and North America is so great as to practically amount to identity."

But, side by side with such evidence of broad distribution, we are confronted with facts which go to show that, even at the dawn of Palæozoic times, the oceanic areas at all events had their more or less distinct life-provinces. While many of the old forms were cosmopolitan, others were apparently restricted in their range. It would be strange, indeed, had it been otherwise; for, however uniform the climatic conditions may have been, still that uniformity was only comparative. An absolutely uniform world-climate is well-nigh inconceivable. All we can maintain is that the conditions during certain prolonged periods were so equable as to allow of the general diffusion of species over vastly greater areas than now; and that such conditions extended from low latitudes up to polar regions. Now, among the chief factors which in our day determine the limitation of faunas and floras, we must reckon latitude and the geographical position of land and water. What, then, it may be asked, were the causes which allowed of the much broader distribution of species in former ages?

It is obvious that before a completely satisfactory answer to that question can be given, our knowledge of past geographical conditions must be considerably increased. If we could prepare approximately correct maps and charts to indicate the position of land and sea during the formation of the several fossiliferous systems, we should be able to reason with some confidence on the subject of climate. But, unfortunately, the preparation of such correct maps and charts is impossible. The data for compilations of the kind required are still inadequate, and it may well be doubted whether, in the case of the older systems, we shall ever be able to arrive at any detailed knowledge of their geographical conditions. Nevertheless, the geological structure of the earth's crust has been so far unravelled as to allow us to form certain general conceptions of the conditions that must have attended the evolution of our continents. And it is with such general conceptions only that I have at present to deal.

I said a little ago that the question of geological climates must now be considered from the point of view of the permanency of the great dominant features of the earth's crust. I need not recapitulate the evidence upon which Dana and his followers have based this doctrine of the primeval antiquity of our continental and oceanic areas. It is enough if I remind you that by continental areas we simply mean certain extensive regions in which elevation has, upon the whole, been in excess of depression; by oceanic area, on the other hand, is meant that vast region throughout which depression has exceeded elevation. Thus, while the area of permanent or preponderating depression has, from earliest geological times, been occupied by the ocean, the continental areas have been again and again invaded by the sea—and even now extensive portions are under water. It is not only the continental dry land, therefore, but all the bordering belt of sea-floor which does not exceed 1000 fathoms or so in depth, that must be included in the region of dominant elevation. Were the whole of this region to be

raised above the level of the sea, the present continents would become connected so as to form one vast land-mass, or continental plateau. (D. Plate I.)

All the sedimentry strata with which we are acquainted have been accumulated over the surface of that great plateau, and consequently are of comparatively shallow-water origin. They show us, in fact, that at no time in geological history has that plateau ever been drowned in depths at all comparable to those of the deeper portions of our oceanic troughs. The stratified rocks teach us, moreover, that the present land-areas have been gradually evolved, and that, notwithstanding many oscillations of level, these areas have continued to increase in extent—so that there is probably more land-surface now than at any previous era in the history of our globe. To give even a meagre outline of the evidence bearing upon this interesting subject is here impossible. All that I can do is to indicate very briefly some of the general results to which that evidence seems to lead.

The oldest rocks with which we are acquainted are the so-called Archæan schists.[1] But these have hitherto yielded no unequivocal traces of organic life, and as their origin is still doubtful, it would obviously be futile to speculate upon the geographical conditions of the earth's surface at the time of their formation. Reliable geological history only begins with the fossiliferous strata of the Palæozoic era. From these we learn that in the European area the Archæan rocks of Britain, Scandinavia, and Finland formed, at that time, the most extensive tract of dry land in our part of the world. How far beyond the present limits of Europe that ancient northern land extended, we cannot tell; but it probably occupied considerable regions which are now submerged in the waters of the Arctic Ocean. Further south, the continental plateau appears to have been, for the most part, overflowed by a shallow sea, the surface of which was dotted by a few islands of Archæan rocks, occupying the sites of what are now some of the hills of Middle Germany and the Archæan districts of France and the Iberian Peninsula. Archæan rocks occur likewise in Corsica and Sardinia, and again in Turkey, and they also form the nuclei of most of the great European mountain-chains, as the Pyrenees, the Alps, the Carpathians, and the Urals. These areas of crystalline schists may not, it is true, have existed as islands at the beginning of Palæozoic times, for they were doubtless ridged up by successive elevations at later dates; but their very presence as mountain-nuclei is sufficient to show that at a very early geological period, the continental plateau could not have been covered by any great depth of sea. We can go further than this,—for all the evidence points to the conclusion that, even so far back as Cambrian times, the dominant features of the present European continent had been, as it were, sketched out. Looked at broadly, that part of the great continental plateau upon which our European lands have been gradually built up may be said to be traversed from west to east by two wide depressions, separated by an

[1] I need hardly remind geologists that some of the so-called "Archæan schists" may really be the highly altered accumulations of later geological periods.

intervening elevated tract. The former of these depressions corresponds to the great Central Plain which passes through the south of England, north-east of France, and the Low Countries, whence it sweeps through Germany, to expand into the extensive low grounds of central and northern Russia. The southern depression embraces the maritime tracts of the Mediterranean, and the regions which that sea covers. To these dominant features all others are of subordinate importance. The two great troughs are belts of depression in the continental plateau itself. The northern one is of extreme antiquity—it is older, at all events, than the Cambro-Silurian period. Even at that distant date, its southern limits were marked out by ridges of Archæan rock, which, as I have said, seem to have formed islands in what is now Central Europe. It was probably always the shallower depression of the two, for we have evidence to show that again and again, in Mesozoic and later times, the sea that overflowed what are now the central lowlands of Europe, was of less considerable depth than that which occupied the Mediterranean trough.

If we turn to North America, we find similar reason to conclude with Professor Dana that the general topography of that region had likewise been foreshadowed as far back as the beginning of the Palæozoic era. Dana tells us that even then the formation of its chief mountain-chains had been commenced, and its great intermediate basins were already defined. The oldest lands of North America were built up, as in Europe, of azoic rocks, and were grouped chiefly in the north. Archæan masses extend over an enormous region, from the shores of the Arctic Ocean down to the great lake country, and they are seen likewise in Greenland and many of the Arctic islands. They appear also in the long mountain-chains that run parallel with the coast-lines of the continent. In a word, the present distribution of the Archæan rocks, and their relation to the overlying strata, leads to the belief that in North America, just as in Europe, they form the foundation-stones of that continent, and stretch continuously throughout its whole extent.

We know comparatively little of the geology of the other great land-masses of the globe, but from such evidence as we have, there is reason to believe that these in their general structure have much the same story to tell as Europe and North America. In South America, Archæan rocks extend over vast areas in the east and north-east, and reappear in the lofty mountain-chains of the Pacific border. They have been recognised also in various parts of Africa, alike in the north and east, in the interior, and in the west and south. In Asia, again, they occupy wide areas in the Indian Peninsula; they are well developed in the Himalaya, while in China and the mountains and plateaux of Central Asia azoic rocks, which are probably of Archæan age, are well developed. The crystalline schists, which cover extensive tracts in Australia and in the northern island of New Zealand, have also been referred to the same age. Thus, all the world over, Archæan rocks seem to form the surface of the ancient continental plateau upon which all other sedimentary strata have been accumulated. And in every region where Palæozoic rocks occur, we have evidence to prove that at the time these last were formed vast areas of the old continental plateau were under water.

The geological structure of the Palæozoic tracts of Europe and America has shown us that, during the protracted period of their accumulation, and notwithstanding many oscillations of level, the land-surface continued to increase. The same growth of dry land characterised Mesozoic and Cainozoic times,—the primeval depressions that traverse the continental plateau became more and more silted up, and the sea eventually disappeared from extensive regions which it had overflowed in Palæozoic ages. This land-growth, of course, was not everywhere continuous. Again and again, throughout wide tracts, depression was in excess of sedimentation and elevation. Even at the present time, broad tracts of what was once dry land are submerged. But the simple fact that the younger fossiliferous strata do not extend over such wide areas as the older systems, is sufficient proof that our land-masses have all along tended to grow, and to become more and more consolidated.

Reference has already been made to the remarkable fact that no abysmal accumulations have yet been detected amongst the stratified rocks of the earth's crust. Ordinary clastic rocks, such as shale, sandstone, and conglomerate—altered or unaltered, as the case may be—form by far the largest proportion of our aqueous strata, and speak to us only of shallow waters. It is true that some of our limestones must have accumulated in moderately deep clear seas, yet none of these limestones is of abysmal origin. They prove that portions of the continental plateau have now and again been submerged for several thousand feet, but afford no evidence of depths comparable to those of the present oceanic basins. The enormous thickness attained by the sedimentary strata can only be explained on the supposition that deposition took place over a gradually sinking area. And thus it can be shown that, within the continental plateau, movements of depression have been carried on more or less continuously during vast periods of time—and yet so gradually, that sedimentation was able to keep pace with them. Take, for example, the Cambrian strata of Wales and Shropshire—all, apparently, shallow water deposits—which attain a thickness of 30,000 feet, or thereabout; or the Silurian strata of the same regions, which are not much less than 20,000 feet thick; and similar great depths of sedimentary rocks might be cited from North America. Passing on to later periods, we find like evidence of long-continued depression in the thick sediments of the younger Palæozoic systems. It is noteworthy, however, that when we come down to still later ages, the movements of depression, as measured by the depths of the strata, appear to have become less and less extensive and profound. Each such movement of depression was eventually brought to a close by one or more movements of upheaval—slowly or more rapidly effected, as the case may have been. Here, then, we are confronted with the striking fact that the continental plateau has, from time to time, sunk down over wide areas to depths exceeding those of existing oceans, and yet at so slow a rate, that sedimentation prevented the depressed regions from becoming abysmal. It is obvious, then, that such areas are now dry land simply because, in the long-run, sedimentation and upheaval have been in excess of depression.

And yet, notwithstanding the numerous upheavals which have taken

place over the continental plateau, these have succeeded in doing little more than drain away the sea more or less completely from the great primeval depressions by which that plateau is traversed. If it be true, therefore, that the continental plateau owes its existence to the sinking down of the earth's crust within the oceanic basins—if the continents have been squeezed up by the tangential thrusts exerted by the sinking areas that surround them—then it follows that while lands have been gradually extending over the continental plateau, the bed of the ocean has been sinking to greater and greater depths.

If this general conclusion holds good, it is obvious that the oceanic troughs of early geological times could not have been so deep as they are now. During the Palæozoic period, the most continuous areas of dry land, as we have seen, were distributed over the northern parts of our hemisphere, while, further south, groups of islands indicated the continuation of the continental plateau. Doubtless South America, Africa, Asia, and Australia were, at that distant date, represented by similar detached areas of dry land. In a word, the primeval continental plateau was still largely under water. Judging from the character and broad distribution of the Palæozoic marine faunas, the temperature of the sea was wonderfully uniform. There is certainly nothing to indicate the existence of such climatic zones as those of the present. We know very little of the terrestrial life of early Palæozoic times—the Cambro-Silurian strata are essentially marine. Land-plants, however, become more numerous in the Old Red Sandstone, and, as every one knows, they abound in the succeeding Carboniferous and Permian systems. And the testimony of these floras points to the same conclusion as that furnished by the marine faunas. The Carboniferous floras of the Arctic regions, and of temperate Europe and America, not only have the same *facies*, but a considerable number of the species are common to both areas; while many European species occur in the Carboniferous strata of Australia and other distant lands. This common *facies*, and the presence of numerous cosmopolitan forms, surely indicate the former prevalence of remarkably uniform climatic conditions. The conditions, of course, need not—indeed, could not—have been absolutely uniform. At present the various climates which our globe experiences depend upon the amount of heat received directly and indirectly from the sun—oceanic and aërial currents everywhere modifying the results that are due to latitude. It cannot have been otherwise in former times. In all ages the tropics must have received more direct sun heat than temperate and polar regions: and however much the climatic conditions of the Palæozoic era may have differed from the present—however uniformly temperature may have been distributed—still, as I have said, absolute uniformity was impossible. It was doubtless owing to the fact that the dry lands of Palæozoic times were not only much less extensive than now, but more interrupted, straggling, and insular, that the climate of the globe was so equable. Under such geographical conditions, great oceanic currents would have a much freer course than is now possible, and warm water would find its way readily across wide regions of the submerged continental plateau into the highest latitudes. The winds blowing athwart the land would everywhere be moist and warm,

and no such marked differences of temperature, such as now obtain, would distinguish the Arctic seas from those of much lower latitudes. At the same time, the comparatively shallow water overlying the submerged areas of the continental plateau would favour the distribution of species, and thus bring about that wide distribution of cosmopolitan forms and general similarity of *facies*, which are such marked features of the Palæozoic faunas. It is even quite possible that migration may have taken place here and there across the great oceanic depression itself; for it may well be doubted whether, at so early a period, that depression had sunk down to its present depth below the level of the continental plateau.

Yet, notwithstanding such facilities for migration, and the consequent similarity of *facies* I have referred to, the Palæozoic faunas of different regions have usually certain distinctive characters. Even at the very dawn of the era the marine faunas were already grouped into provinces, sometimes widely separated from one another, at other times closely adjacent, so that it is evident that barriers to migration here and there existed. It could hardly have been otherwise; for local and more widely-spread movements of elevation and depression took place again and again during Palæozoic times.

While the younger Palæozoic systems were being accumulated, excess of upheaval over depression resulted in the gradual increase of the land. The continental plateau came more and more to the surface, in spite of many oscillations of level. It is quite possible, nay, even probable that this persistent growth of land, and consequent modification of oceanic currents may have rendered the climatic conditions of later Palæozoic times less uniform; but, if so, such diminished uniformity has left no recognisable impress on either faunas or floras. For fossils characteristic of the Devonian and Carboniferous strata of temperate latitudes occur far within the Arctic Circle.

Descending to the Mesozoic era, we find that the character and distribution of marine faunas are still indicative of uniformity. There could have been little difference of temperature at that time between Arctic seas and those of our own latitude. Cosmopolitan species abounded in the Jurassic waters, but were relatively less numerous in those of the Cretaceous period. Professor Neumayr maintains that already, in the Jurassic period, the climate had become differentiated into zones. This, he thinks, is indicated by the fact that coral reefs abound in the Jurassic strata of Central Europe, while they are wanting in the contemporaneous deposits of boreal regions. Dr. Heilprin, on the other hand, is of opinion that this and certain other distinctive features of separate Jurassic life-provinces may not have been due to differences of temperature, but rather to varying physical conditions, such as character of the sea-bottom, depth of water, and so forth. Perhaps the safest conclusion we can come to, in the present state of the evidence, is that the climatic conditions of the Mesozoic era were, upon the whole, less obviously uniform than those of earlier ages, but that marked zones of climate like the present had not as yet been evolved. At the same time, when we consider how many great geographical revolutions took place during the period in question, we must be prepared to admit that these could hardly

fail to have influenced the climate, and thus to have induced modifications in the distribution of faunas and floras. And probably evidence of such modifications will yet be recognised, if indeed the phenomena referred to by Neumayr be not a case in point. It may be noted, further, that while, according to many botanists, the plants of the Palæozoic periods bespeak not only uniform climatic conditions but the absence of marked seasonal changes, those of late Mesozoic times are indicative of less uniformity. The Cretaceous conifers, for example, show regular rings of growth, and betoken the existence of seasons, which were much less marked, however, than is now the case.

The geographical changes of Mesozoic times were notable in many respects. The dominant features of Europe, already foreshadowed in early Palæozoic times, had become more clearly outlined before the close of the Cretaceous period. Notwithstanding many movements of depression, the chief land-areas continued to show themselves in the north and north-west. The highest grounds were the Urals, and the uplands of Scandinavia and Britain. In Middle Europe the Pyrenees and the Alps were as yet inconsiderable heights, the loftiest lands in that region being those of the Harz, the Riesengebirge, and other tracts of Archæan and Palæozoic rocks. The lower parts of England and the great lowland plains of Central Europe were sometimes submerged in the waters of a wide, shallow sea, but ever and anon elevation ensued, new lands appeared, and these waters became divided into a series of large inland seas and lakes. In the south, a deep Mediterranean sea would appear to have persisted all through the Mesozoic era—a sea of considerably greater extent, however, than the present.

While in Europe the dominant features of the continental plateau run approximately west and east, in North America they follow nearly the opposite direction. In early Mesozoic times, vast tracts of dry land extended across the northern and eastern sections of the latter area. Over the Rocky Mountain region, low lands and saline lakes appear to have stretched, while further west the area of the Great Plateau and the Pacific slope were covered by the sea. Towards the end of the Mesozoic era, the land in the far west became more continuous—a broad belt extending in the direction of the Pacific coast-line from Mexico up to high northern latitudes. In short, before the Cretaceous period closed, the major portion of North America had been evolved. A considerable tract of what is now the western margin of the continent, however, was still under water, while from the Gulf of Mexico (then much wider than now) a broad Mediterranean sea swept north and north-west through Texas and the Rocky Mountain region to communicate with the Arctic Ocean. All to the east of this inland sea was then, as it is now, dry land. Thus, up to the close of the Cretaceous period, in America and Europe alike, oceanic currents coming from the south had ready access across the primeval continental plateau to the higher latitudes. Southern Europe indeed, during Mesozoic times, was simply a great archipelago, having free communication on the one hand across the low grounds of Central and Northern Russia with the Arctic Seas, and, on the other, across vast regions in Asia with the Indian Ocean.

Of the other great land-masses of the globe our knowledge is too limited to allow us to trace their geographical evolution with any confidence. But from the very wide distribution of Mesozoic strata in South America, Africa, Asia, and Australia, there can be no doubt that, at the time of their accumulation, enormous tracts in those regions were then under water. The land-masses, in short, were not so continuous and compact as they are at present. And although we must infer that considerable areas of Mesozoic land are now submerged, yet these cannot but bear a very small proportion to the wide regions which have been raised above the sea-level since Mesozoic times. In short, from what we do know of the geological structure of the continents in question, we can hardly doubt that they have passed through geographical revolutions of a like kind with those of Europe and North America. Everywhere over the great continental plateau elevation appears, in the long-run, to have been in excess of depression, so that, in spite of many subsidences, the tendency of the land throughout the world has been to extend its margins, and to become more and more consolidated. The Mesozoic lands were larger than those of the preceding Palæozoic era, but they were still penetrated in many places by the sea, and warm currents could make their way over wide tracts that are now raised above the sea-level. Under such circumstances approximately uniform conditions of climate could not but obtain.

Great geographical changes supervened upon the close of the Cretaceous period. North America then acquired nearly its present outline. Its Mediterranean sea had vanished, but the Gulf of Mexico still overflowed a considerably wider region than now, while a narrow margin of the Pacific border of the continent continued submerged. In Europe elevation ensued, and the sea which had overspread so much of the central and eastern portions of our continent disappeared. Southern Europe, however, was still largely under water, while bays and inlets extended northwards into what are now the central regions of the continent. On to the close of the Miocene period, indeed, the southern and south-eastern tracts of Europe were represented by straggling islands. In middle Cainozoic times the Alps, which had hitherto been of small importance, were considerably upheaved, as were also the Pyrenees and the Carpathians; and a subsequent great elevation of the Alpine area was effected after the Miocene period. Notwithstanding these gigantic movements, the low-lying tracts of what is now Southern Europe continued to be largely submerged, and even the central regions of the Continent were now and again occupied by broad lakes, which sometimes communicated with the sea. After the elevation of the Miocene strata, these inland seas disappeared, but the Mediterranean still overflowed wider areas than it does to-day. Eventually, however, in late Pliocene times, the bed of that sea experienced considerable elevation; and it was probably at or about this stage that the Black Sea and the Sea of Azov retreated from the broad low grounds of southern Russia, and that the inland seas and lakes of Austria-Hungary finally vanished.

The movements of upheaval, which caused the Cretaceous seas to disappear from such broad areas of the continental plateau, induced many

changes in the floras and faunas of the globe. A notable break in the succession occurs between the Cretaceous and the Eocene, hardly one species of higher grade than the protozoa passing from one system to the other. In the Cainozoic deposits, we are no longer confronted with numerous cosmopolitan species—the range of marine forms has become much more restricted. Nevertheless, the faunas and floras continue to be indicative of much warmer climates for Arctic and temperate latitudes than now obtain. But, at the same time, differentiation of climate into zones is distinctly marked. In the early Cainozoic period, our present temperate latitudes supported a flora of decidedly tropical affinities, while the fauna of the adjacent seas had a similar character. Later on the climate of the same latitudes appears to have passed successively through sub-tropical and temperate stages. In short, a gradual lowering of the temperature is evinced by the character and distribution both of floras and faunas. The differentiation of the climate during one stage of the Cainozoic era is well illustrated by the Miocene flora. Thus, at a time when Italy was clothed with a tropical vegetation, in which palm-trees predominated, Middle Europe had its extensive forests of evergreens and conifers, while in the region of the Baltic conifers and deciduous trees were the prevalent forms.

When one takes into consideration the fact that, notwithstanding many oscillations of level, the land during Cainozoic times was gradually extending, and the sea disappearing from wide regions which it had formerly covered, one can hardly doubt that the seemingly gradual change from tropical to temperate conditions was due, in large measure, to that persistent continental growth. I confess, however, that it is difficult to account for the very genial climate which continued to prevail over the Arctic regions. So far as one can gather from the evidence at present available, some of the marine approaches to those latitudes had been cut off by the movements of elevation which brought the Cainozoic era to a close, while the Arctic lands were perhaps more extensive than they are now. The Cretaceous Mediterranean of North America had vanished, and we cannot prove that the Tertiary Sea of Southern Europe communicated across the low grounds of Russia with the Arctic Ocean. We know, however, that the Archipelago of Southern Europe was in direct connection with the Indian Ocean, and it is most probable that a wide arm of the same sea stretched north from the Aralo-Caspian area through Siberia. Indeed, much of what are now the lowlands of western and northern Asia were probably sea in Tertiary times. It seems likely, therefore, that, even at this late period, marine currents continued to reach the Arctic zone, across the continental plateau. When the warm waters of the Indian Ocean eventually ceased to invade Europe, and the Mediterranean became much restricted in area, the climate of the whole continent could not fail to be profoundly affected.

There is yet another line of evidence to which brief reference may be made. I have spoken of the remarkable uniformity of climatic conditions which obtained in Palæozoic times, and of the gradual modification of those conditions which subsequently supervened. Now, it is worthy of note that in their lithological characters the oldest sedimentary strata

themselves likewise exhibit a prevalent uniformity which in later systems becomes less and less conspicuous. The Cambro-Silurian mechanical sediments, for example, maintain much the same character all the world over; and the like is true, although in a less degree, of the marine accumulations of the Devonian period. The corresponding mechanical deposits of later Palæozoic ages continue to show more and more diversity, but at the same time they preserve a similarity of character over much more extensive areas than is found to be the case with the analogous sediments of the Mesozoic era. Finally, these last are more or less strongly contrasted with the marine mechanical accumulations of Cainozoic times, which are altogether more local in character. This increasing differentiation is quite in keeping with what we know of the evolution of our land-areas. In early Palæozoic ages, when insular conditions prevailed and the major portion of the primeval continental plateau was covered by shallow seas, it is obvious that mechanical sediments would be swept by tidal and other currents over enormous areas, and that these sediments would necessarily assume a more or less uniform character. Indeed, I suspect that much of the sediment of those early seas may have been the result of tidal scour, and that marine erosion was more generally effective then than it is now. With the gradual growth of the land and the consequent deflection and limitation of currents, marine mechanical sediments would tend to become more and more local in character. Thus the increasing differentiation which we observe in passing from the earlier to the later geological systems is just what might have been expected.

Summing up, now, the results of this rapid review of the evidence, we seem justified in coming to the following conclusions:—

1*st*. In Palæozoic times, Europe and North America were represented by considerable areas of dry land, massed chiefly in the higher latitudes, while further south groups of smaller islands were scattered over the submerged surface of the primeval continental plateau. The other continents appear, in like manner, to have been represented by islands—some of which may have reached continental dimensions. A very remarkable uniformity of climate accompanied these peculiar geographical conditions.

2*nd*. In Mesozoic times, the primeval continental plateau came more and more to the surface, but the land-areas were still much interrupted, so that currents from tropical regions continued to have ready access to high latitudes. The climate of the whole globe, therefore, was still uniform, but apparently not so markedly so as in the preceding era.

3*rd*. In Cainozoic times, the land-masses continued to extend, and and the sea to retreat from hitherto submerged areas of the continental plateau; and this persistent land-growth was accompanied by a gradual lowering of the temperature of northern and temperate latitudes, and a more and more marked differentiation of climate into zones.

Having thus very briefly sketched the geographical evolution of the land during Palæozoic, Mesozoic, and Tertiary times, and come to the general conclusion that climate has varied according to the relative position of land and sea, I have next to consider the geographical and

climatic conditions of the Quaternary period. These, however, are now so well known, that I need do no more than remind you that, so far as the chief features of our lands are considered, all these had come into existence before the dawn of the Ice Age. The greater contours of the surface, which were foreshadowed in Palæozoic times, and which in Mesozoic times were more clearly indicated, had been full evolved by the close of the Pliocene period. The connection between the Mediterranean and the Indian Ocean probably ceased in late Pliocene times. The most remarkable geographical changes which have taken place since then within European regions have been successive elevations and depressions, in consequence of which the area of our continent has been alternately increased and diminished. At a time well within the human period, our own islands have been united to themselves and the continent, and the dry land has extended north-west and north, so as to include Spitzbergen, the Färoe Islands, and perhaps Iceland. On the other hand, our islands have been within a recent period largely submerged. Similarly, in North America, we are furnished with many proofs of like oscillations of level having taken place in Quaternary times. Is it possible, then, to explain the climatic vicissitudes of the Pleistocene period by means of such oscillations? Many geologists have tried to do so, but all these attempts have failed. It is quite true that a general elevation of the land in high latitudes would greatly increase the ice-fields of Arctic regions, and might even give rise to perennial snow and glaciers in the mountain-districts of our islands. But it is inconceivable that any such geographical change could have brought about that general lowering of temperature over the whole northern hemisphere which took place in Pleistocene times. For we have to account not only for the excessive glaciation of northern and north-western Europe, and of the northern parts of North America, but for the appearance of snow-fields and glaciers in much more southern latitudes, and in many parts of Asia where no perennial snow now exists. Moreover, we have to remember that Arctic conditions of climate obtained in north-western Europe even when the land was relatively much lower than it is at present. The Arctic shell-beds of our own and other temperate regions sufficiently prove that geographical conditions were not the only factor concerned in bringing about the peculiar climate of the Pleistocene period. Then, again, we must not forget that at certain stages of the same period genial conditions of climate were coincident with a much wider land-surface in north-western Europe than now exists. The very fact that interglacial deposits occur in every glaciated region is enough of itself to show that the Arctic conditions of the Pleistocene could not have resulted entirely from a mere elevation of land in the northern parts of our hemisphere.

The only explanation of the peculiar climatic vicissitudes in question which seems to meet the facts, so far as these have been ascertained, is the well-known theory advanced by Dr. Croll. After carefully considering all the objections which have been urged against that theory, there is only one, as it seems to me, that is deserving of serious attention. This objection is not based on any facts connected with the Pleistocene

deposits themselves, but on evidence of quite another kind. It is admitted that were the Pleistocene deposits alone considered, Croll's theory would fully account for the phenomena. But, it is argued, we cannot take the Pleistocene by itself, for if that theory be true, then climatic conditions similar to those of the Pleistocene must have supervened again and again during the past. Where, then, we are asked, is there any evidence in Palæozoic, Mesozoic, or Cainozoic strata of former wide-spread glacial conditions? If continental ice-sheets, comparable to those of the Pleistocene, ever existed in the earlier ages, surely we ought to find more or less unmistakable traces of them. Now, at first sight, this looks a very plausible objection, but it has always seemed to me to be based upon an assumption that is not warranted by our knowledge of geographical evolution. Dr. Croll would be the first to admit that high eccentricity of the earth's orbit might have happened again and again without inducing glacial conditions like those of the Pleistocene. The objection takes no account of the fact that the excessive climate of the glacial period was only possible because of special geographical conditions—conditions that do not appear to have been fully evolved before Pliocene times. No one has seen this more clearly than Mr Wallace,[1] with the general drift of whose argument I am quite at one. In earlier ages, the warm water of the tropics overflowed wide areas of our present continents—most of the dry land was more or less insular, and the seas within the Arctic Circle were certainly not cold as at present, but temperate and even genial. If we go back to Cambro-Silurian times, we find only the nuclei, as it were, of our existing continents appearing above the surface of wide-spread shallow seas. It is quite impossible, therefore, that under such geographical conditions, great continuous ice-sheets, like those of the Pleistocene, could have existed—no matter how high the eccentricity of the earth's orbit may have been. The most that could have happened during such a period of eccentricity, would be the accumulation of snow-fields on mountains and plateaux of sufficient height, the formation here and there of local glaciers, and the descent of these in some places to the sea. And what evidence of such local glaciation might we now expect to find? No old land surface of that far-distant period has come down to us: we look in vain for Cambro-Silurian *roches moutonnées* and boulder-clay or moraines. The only evidence we could expect is just that which actually occurs, namely, erratics (some of them measuring five feet and more in diameter) imbedded in marine deposits. It may be said that a few erratics are hardly sufficient to prove that a true glacial period supervened in Cambro-Silurian times, and I do not insist that they are. But I certainly maintain that if any lowering of the temperature were induced by high eccentricity of the earth's orbit during Cambro-Silurian times, then ice-floated erratics are the only evidence of refrigeration that we need ever hope to find. The geographical conditions of early Palæozoic times forbade the formation of enormous ice-sheets like those of the Pleistocene period. Extreme climatic changes were then impossible, and periods of high eccentricity

[1] See *Island Life*.

might have come and gone without inducing any modifications of flora and fauna which we could now recognise. We are practically ignorant of the terrestrial life of the globe at that distant period, and our knowledge of the marine fauna is not sufficient to enable us to deny the possibility of moderate fluctuations in the temperature of the seas of early Palæozoic times. Moreover, we must not forget that there were then no such barriers to migration as now exist. If the conditions became temporarily unsuitable, marine organisms were free to migrate into more genial waters and to return to their former habitats when the unfavourable conditions had passed away.

The uniform climate so characteristic of the Cambro-Silurian period appears to have prevailed likewise during the later stages of the Palæozoic era. This we gather from a general consideration of the floras and faunas, and their geographical distribution. The dry land, as we have seen, continued to increase in extent; but vast areas of the primeval continental plateau of the globe still continued under water, and currents from southern latitudes flowed unrestricted into Polar regions. During the protracted lapse of time required for the formation of the later Palæozoic systems several periods of high eccentricity must have occurred. But, so far as one can judge, the disposition of the larger land-areas was never such as to induce a true Ice Age. Nevertheless we are not without evidence of ice-action in Old Red Sandstone, Carboniferous, and Permian strata. And it seems to me probable that the erratic accumulations referred to may really indicate local glacial action, of more or less intensity, brought about by such lowering of the temperature as would supervene during a period of high eccentricity. It is true we may explain the phenomena by inferring the existence of mountains of sufficient elevation—and this, indeed, is the usual explanation. But it is doubtful whether those who adopt that view have fully considered what it involves. Take, for example, the case of the breccias and conglomerates of the Lammermuir Hills, which have all the appearance of being glacial and fluvio-glacial detritus. These deposits overlie the highly denuded Silurian greywackés of Haddingtonshire in the north and of Berwickshire in the south, and have evidently been derived from the intervening high grounds—the width of which between the Old Red Sandstone accumulations in question does not exceed eight or nine miles. The breccias reach a height of 1300 feet, while the dominating point of the intervening uplands is 1700 feet. Under present geographical conditions it is doubtful whether perennial snow and glaciers of any size at all could exist in the region of the Lammermuirs at a less altitude than 7000 feet or more. But between the breccias of Haddingtonshire and the equivalent deposits in Berwickshire there is no space for any intermediate range of mountains of circumdenudation of such a height. Moreover, we must remember that under the extremely uniform conditions which obtained in Palæozoic times the snow-line could not possibly have been attained even at that elevation. When the Devonian coral-reefs described by Dupont were growing in the sea that overflowed Western Europe, to what height must the southern uplands of Scotland have been elevated in order to reach the snow-line! We may make what

allowance we choose for the denudation which the Silurian rocks of the Lammermuirs must have experienced since the deposition of the Old Red Sandstone, but it is simply a physical impossibility that mountains of circumdenudation of the desiderated height could ever have existed in the Lammermuir region at the time the coarse breccias were being accumulated.[1] It seems to me, then, that these breccias are in every way better accounted for by a lowering of temperature due to increased eccentricity of the orbit. This view frees us from the necessity of postulating excessive upheavals over very restricted areas, and of creating Alps where no Alps could have existed.

When we consider the enormous thickness of the strata that constitute any of our larger coal-fields, we can hardly doubt that one or more periods of high eccentricity must have occurred during their accumulation. It does not follow, however, that we should be able to detect in these strata any evidence of alternating cold and warm epochs. So long as ocean-currents from the tropics found ready entrance to polar regions across vast tracts of what is now dry land, extreme and wide-spread glacial conditions were impossible. Any lowering of temperature due to cosmical causes might indeed induce new snow-fields and glaciers to appear or existing ones to extend themselves in northern regions and the most elevated lands of lower latitudes. But such local glaciation need not have seriously affected any of the areas in which coal-seams were being formed. For nothing appears more certain than this—that our coal-seams as a rule were formed over broad, low-lying, alluvial lands, and in swamps and marshes, along the margins of estuaries or shallow bays of the sea. Some seams, it is true, are evidently formed of drifted vegetable débris, but the majority point to growth *in situ*. The strata with which they are associated are shallow-water sediments which could only have been deposited at some considerable distance from any mountain-regions in which glaciers were likely to exist. It is idle, therefore, to ask for evidence of glacial action amongst strata formed under such conditions. The only evidence of ice-work we are likely to get is that of erratics. And these are not wanting, although it is probable that most of those which are found imbedded in coals have been transported by rafts of vegetable matter or in the roots of trees. The same explanation, however, will not account for the boulders which Sir William Dawson has recorded from the coal-fields of Nova Scotia. He describes them as occurring on the outside of a gigantic esker of Carboniferous age, and thinks they were probably dropped there by floating ice at a time when coal-plants were flourishing in the swamps on the other side of the gravel embankment.

If the disposition of the land-areas in Carboniferous times rendered such an ice-age as that of the Pleistocene impossible—in other words, if the effects flowing from high eccentricity of the orbit must to a large extent have been neutralised—the flora and fauna of the period can

[1] It may be objected that the conglomerates were probably not marine, but deposited in lakes, the beds of which may have been much above sea-level. But from all that we know of the Old Red Sandstone of Scotland it would appear that the lakes of the period now and again communicated with the sea, and were probably never much above its level.

hardly be expected to yield any recognisable evidence of fluctuating climatic conditions. When our winter happened in aphelion new snow-fields might have appeared, or already existing glaciers might have increased in size; while, with the winter in perihelion, the temperature of northern latitudes would doubtless be raised. But the general result would simply be an alternation of warm and somewhat cooler conditions. And such fluctuations of climate might readily have taken place without materially modifying the life of the period.

The breccias of the Permian system have been described by Ramsay as of glacial origin. Some geologists agree with him, while others do not—and many have been the ingenious suggestions which these last have advanced in explanation of the phenomena. Some have tried to show how the stones and blocks in the breccias may have been striated without having recourse to the agency of glacier-ice, but they cannot explain away the fact that many of the stones (which vary in size from a few inches to three or four feet in diameter) have travelled distances of thirty or forty miles from the parent rocks. Similar erratic accumulations, which may belong to the same system or to the Carboniferous, occur in India and Australia. According to Dr. Blandford, the Indian boulder-beds are clearly indicative of ice-action, and he does not think that they can be explained by an assumed former elevation of the Himalaya. On the contrary, he is of opinion that the facts are best accounted for by a general lowering of the temperature, due probably to the action of cosmical causes. Daintree, Wilkinson, R. Oldham, and others who have studied the Australian erratic beds have likewise stated their belief that these are of true glacial origin.

I may pass rapidly over the Mesozoic systems, taking note, however, of the fact that in them we encounter evidence of ice-action of much the same kind as that met with in Palæozoic strata. While, on the one hand, the Mesozoic floras and faunas bespeak climatic conditions similar to those of earlier ages, but probably not quite so uniform; on the other, the occurrence of erratics in various marine accumulations is sufficient to show that now and again ice floated across seas, the floors of which were tenanted by reef-building corals. The geographical conditions continued unfavourable to the formation of extensive ice-sheets in temperate latitudes, no matter how high the eccentricity of the orbit might have been. The erratics which occur in certain Jurassic and Cretaceous deposits are admitted by most geologists to have been ice-borne. Now, it is highly improbable that the transporting agent could have been coast-ice, for it is hardly possible to conceive of ice forming on the surface of a sea in which flourished an abundant Mesozoic fauna. The erratics, therefore, seem to imply the existence in Mesozoic times of local glaciers, which here and there descended to the sea, as in the north-east of Scotland. The erratics in the Scottish Jurassic are evidently of native origin, and it is most improbable that those which have been met with in the chalk of England and France could have floated from any very great distance. How, then, can we explain the appearance of local glaciers in these latitudes during Mesozoic times? The geographical conditions of the period could not have favoured the formation of perennial snow and ice

in our area, unless our lands were at that time much more elevated than now. And this is the usual explanation. It is supposed that mountains much higher than any we now possess probably existed in such regions as the Scottish Highlands. It is easy to imagine the former existence of such mountains. So long a time has elapsed since the Jurassic period, that the Archæan and Palæozoic areas cannot but have suffered prodigious denudation in the interval. But, when one considers how very lofty, indeed, those mountains must have been, in order to reach the snow-line of Jurassic times, one may be excused for expressing a doubt as to whether the suggested explanation is reasonable. At all events, the phenomena are, to say the least, as readily explicable on the supposition that the snow-line was temporarily lowered by cosmical causes. Even with eccentricity at a high value, no great ice-sheets, indeed, could have existed, but local snow-fields and glaciers might have appeared in such mountain-regions as were of sufficient height. And this might have happened without producing any great difference in the temperature of the sea, or any marked modification in the distribution of life. In short, we should simply have, as before, an alternation of warm and somewhat cooler climates, but nothing approaching to the glacial and interglacial epochs of the Pleistocene.

These conclusions seem to me to be strongly supported by the evidence of ice-action during Tertiary times. The gigantic erratics of the Alpine Eocene do not appear to have been derived from the Alps, but rather from the Archæan area of Southern Bohemia. The strata in which they occur are, for the most part, unfossiliferous; they contain only fucoidal remains, and are presumably marine. How is it possible to account for the appearance of these erratics in marine deposits in central Europe at a time when, as evidenced by the Eocene flora and fauna, the climate was warm? Are we to infer the former existence of an extremely lofty range of Bohemian Alps which has since vanished? Is it not more probable that here, too, we have evidence of a lowering of the snow-line, induced by cosmical causes, which brought about the appearance of snow-fields and glaciers in a mountain-tract of much less elevation than would have been required in the absence of high eccentricity of the orbit? If it be objected that such cosmical causes must have had some effect upon the distribution of life, I reply that very probably they had, although not to any extreme extent. The researches of Mr. Starkie Gardner have shown that the flora of the English Eocene affords distinct evidence of climatic changes. But as the geographical conditions of that period precluded the possibility of extensive glaciation, and could only, at the most, have induced local glaciers to appear in elevated mountain-regions, it seems idle to cite the non-occurrence of erratics and morainic accumulations in the Eocene of England and France as an argument against the application of Croll's theory to the case of the erratics of the Flysch. I repeat, then, that under the geographical conditions of the Eocene, all the more obvious effects likely to have resulted from the passage of a period of high eccentricity would be the appearance of a few local glaciers, the existence of which could have had no more influence on the climate of adjacent lowlands than is

notable in similar circumstances in our own day. It is absurd, therefore, to expect to find evidence in Eocene strata of as strongly contrasted climates as those of the glacial and interglacial deposits of the Pleistocene. There must, doubtless, have been alternations of climate in our hemisphere; but these would consist simply of passages from warm to somewhat cooler conditions—just such changes, in fact, as are suggested by the plants of the English Eocene.

The evidence of ice-action in the Miocene strata is even more striking than that of which I have just been speaking. The often-cited case of the erratics of the Superga near Turin, I need do little more than mention. These erratics were undoubtedly carried by icebergs, calved from Alpine glaciers at a time when northern Italy was largely submerged. The erratic deposits are unfossiliferous, and are underlaid and overlaid by fossiliferous strata, in none of which are any erratics to be found. What is the meaning of these intercalated glacial accumulations? Can we believe it possible that the Miocene glaciers were enabled to reach the sea in consequence of a sudden movement of elevation, which must have been confined to the Alps themselves? Then, if this be so, we must go a step further, and suppose that, after some little time, the Alps were again suddenly depressed, so that the glaciers at once ceased to reach the sea-coast. For, as Dr. Croll has remarked, "had the lowering of the Alps been effected by the slow process of denudation, it must have taken a long course of ages to have lowered them to the extent of bringing the glacial state to a close." And we should, in such a case, find a succession of beds indicating a more or less protracted continuance of glacial conditions, and not one set of erratic accumulations intercalated amongst strata, the organic remains in which are clearly suggestive of a warm climate. The occurrence of erratics in the Miocene of Italy is all the more interesting from the fact that in the Miocene of France and Spain similar evidence of ice-action is forthcoming.

Opponents of Dr. Croll's theory have made much of Baron Nordenskiöld's statement that he could find no trace of former glacial action in any of the fossiliferous formations within the Arctic regions. He is convinced that "an examination of the geognostic condition, and an investigation of the fossil flora and fauna of the Polar lands, show no signs of a glacial era having existed in those parts before the termination of the Miocene period." Well, as we have seen, there is no reason to believe that the geographical conditions in our hemisphere, at any time previous to the close of the Pliocene period, could ever have induced glacial conditions comparable to those of the Pleistocene Ice Age. The strata referred to by Nordenskiöld, are, for the most part, of marine origin, and their faunas are sufficient to show us that the Arctic seas were formerly temperate and genial. If any ice existed then, it could only have been in the form of glaciers on elevated lands. And it is quite possible that these, during periods of high eccentricity, may have descended to the sea and calved their icebergs; and, if so, erratics may yet be found imbedded here and there in the Arctic fossiliferous formations, although Nordenskiöld failed to see them. One might sail all

round the Palæozoic coast-lines of Scotland without being able to observe erratics in the strata, and yet, as we know, these have been encountered in the interior of the country. The wholesale scattering of erratics at any time previous to the Pleistocene, must have been exceptional even in Arctic regions, and consequently one is not surprised that they do not everywhere stare the observer in the face.

The general conclusion, then, to which I think we may reasonably come, is simply this :—That geological climate has been determined chiefly by geographical conditions. So long as the lands of the globe were discontinuous and of relatively small extent, warm ocean currents reaching Polar regions produced a general uniformity of temperature—the climate of the terrestrial areas being more or less markedly insular in character. Under those conditions, the sea would nowhere be frozen. But when the land-masses became more and more consolidated, when, owing to the growth of the continents, warm ocean currents found less ready access to Arctic regions, then the temperature of those regions was gradually lowered until eventually the seas became frost-bound, and the lands were covered with snow and ice. But while the chief determining cause of climate has been the relative distribution of land and water, it is impossible to doubt that during periods of high eccentricity of the orbit, the climate must have been modified in a greater or less degree. In our own day the geographical conditions are such that, were eccentricity to attain a high value, the climate of the Pleistocene would be reproduced, and our hemisphere would experience a succession of alternating cold and genial epochs.

But in earlier stages of the world's history, the geographical conditions were not of a kind to favour the accumulation of vast ice-fields. During a period of extreme eccentricity, there would probably be fluctuations of temperature in high latitudes; but nothing like the glacial and interglacial epochs of the Pleistocene could have occurred. At most, there would be a general lowering of the temperature, sufficient to render the climate of Arctic seas and lands somewhat cooler, and probably to induce the appearance in suitable places of local glaciers; and, owing to precession of the equinox, these cooler conditions would be followed by a general elevation of the temperature above the normal for the geographical conditions of the period. In Palæozoic and Mesozoic times, the effects of high eccentricity of the orbit appear to have been, in a great measure, neutralised by the geographical conditions, with a possible exception in the Permian period. But in Tertiary times, when the land-masses had become more continuous, the cosmical causes of change referred to must have had greater influence. And I cannot help agreeing with Dr. Croll that the warm climates of the Arctic regions during that era were, to some extent, the result of high eccentricity.

In concluding this discussion, I readily admit that our knowledge of geographical evolution is as yet in its infancy. We have still very much to learn, and I shall be the last to dogmatise upon the subject. But I hope I have made it clear that the evidence, so far as it goes, does not justify the confident assertions of Dr. Croll's opponents, that his theory is contradicted by what we know of the climatic conditions of Palæozoic,

Mesozoic, and Cainozoic times. On the contrary, it seems to me to gain additional support from the very evidence to which Nordenskiöld and others have appealed.

Note.—The accompanying maps (Plates I. and II.) require a few words of explanation. The geology of the world is still so imperfectly known that any attempt at graphic representation of former geographical conditions cannot but be unsatisfactory. The approximate positions of the chief areas of predominant elevation and depression during stated periods of the past may have been ascertained in a general way; but when we try to indicate these upon a map, such provisional reconstructions are apt to suggest a more precise and definite knowledge than is at present attainable. For it must be confessed that there is hardly a line upon the small maps (A, B, C, Plate I.) which might not have been drawn differently. This, of course, is more especially true of South America, Africa, and Asia—of large areas of which the geological structure is unknown (*see* Plate II.) But although the boundaries of the land-masses shown upon the maps referred to are thus confessedly provisional, the maps nevertheless bring out the main fact of a gradual growth and consolidation of the land-areas—a passage from insular to continental conditions. I need hardly say this is no novel idea. It was clearly set forth by Professor Dana upwards of forty years ago (*Silliman's Journal*, 1846, p. 352; 1847, pp. 176, 381), and it received some years later further illustration from Professor Guyot, who insisted upon the *insular* character of the climate during Palæozoic times (*The Earth and Man*, 1850). It must be understood that the maps (A, B, C, Plate I.) are not meant to exhibit the geographical conditions of the world at any one point of time. In Map A, for example, the area coloured blue was not necessarily covered by sea at any particular stage in the Palæozoic era. It simply represents approximately the regions over which Palæozoic marine strata are believed to extend, or to have extended. But, as already stated, numerous oscillations of level occurred in Palæozoic times, so that many changes in the distribution of land and water must have taken place down to the close of the Permian period. The land-areas shown upon the map are simply those which appear to have been more or less persistent through all the geographical changes referred to. Similar remarks apply to the other maps representing the more or less persistent land-areas of Mesozoic and Tertiary times. Thus, for example, there are reasons for believing that Madagascar was joined to the mainland of Africa at some stage of the Mesozoic era, but was subsequently insulated before Tertiary times. Again, as Mr. Wallace has shown, there is every probability that at some later stage of the Mesozoic era a land-connection obtained between New Zealand and Australia. The same naturalist also points out that a chain of islands, now represented by numerous islets and shoals, served in Tertiary times to link Madagascar to India. Map D. shows the areas of predominant elevation and depression. The area coloured brown represents the great continental plateau, which extends downwards to 1000 fathoms or so below the present sea-level. The area tinted blue is the oceanic depression. From the present distribution of plants and animals, we infer that considerable tracts which are now submerged have formerly been dry land —some of these changes having taken place in very recent geological times. And the same conclusions are frequently suggested by geological evidence. There can be little doubt that Europe in Tertiary times extended further into the Northern Ocean than it does now. And it is quite possible that in the Mesozoic and Palæozoic eras considerable land-areas may likewise have appeared here and there in those northern regions which are at present under water.

There is, indeed, hardly any portion of the continental plateau which is now submerged that may not have been land at some time or other. But after making all allowance for such possibilities, the geographical evidence, so far as it goes, nevertheless leads to the conclusion that upon the whole a wider expanse of the primeval continental plateau has come to the surface since Tertiary times than was ever exposed during any former period of the world's history.

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## THE PHYSICAL BASIS OF POLITICAL GEOGRAPHY.

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My subject this evening is a large one. Taken in its widest meaning, the title of my paper seems to invite you to a philosophical discussion on the Free-will question. It is not, however, my intention either to attack, to defend, or to illustrate Buckle's *History of Civilisation*. Suffice it for my purpose that both parties of historians—those who regard man's initiative and those who regard his environment as the more important—both allow at least a large influence in the shaping of his history to the particular stages on which nations play their parts. It is my object this evening to state a few of the ways in which geographical features govern or, at least, guide history, and to give a few of the examples on which my principles are based.

The chief distinction in political geography seems to be founded on the facts that man travels and man settles. Nature has very different relations to travelling and to settling man. Travelling man seeks lines of least resistance over the opposing world. Settling man studies chiefly productivity and security of tenure. A chain of oases in a desert, a fertile valley in a mountain system, may be able to support very few settlers, and yet be a great highway along which emigrants, armies, and merchants have thronged since prehistoric ages. Consider the great barrier of the Alps—no mere boundary wall of Italy, but a whole natural region—a rugged *belt* on the map of Europe, as large as the British Isles, yet so unsuited for settlement that it contains a population not twice as large as that of London. Consider, on the other hand, the passes through those same Alps—all the historic goings to and fro which they have permitted: Gauls swarming to the loot of Italy; legions tramping to the conquest of Gaul and Vindelicia; German hordes bettering the lessons Rome had taught them, descending, half to spoil, half to ennoble the civilisation they took over from antiquity; pilgrims from the extremities to the heart of Christendom; emperors progressing from the German to the Italian half of their Holy Roman Empire; the riches of the East borne from Venice to Augsburg; Suvaroff; Bonaparte; the modern locomotive—all threading narrow valley bottoms—valleys studded with slender strings

of village spires, and shut in on either hand by walls and wastes of rock and snow. Set in contrast to the Alps the great plain of Ireland, teeming with population even to-day, fifty years ago with as many souls as now inhabit the four-times larger Alps; yet, Ireland at the ends of the world, on the road to nowhere, and with a history which rarely touches even the skirts of European politics. The key to the political geography of the Alps is that they are a barrier with definite, though many gates, separating two great unlike areas of settlement. The key to the political geography of Ireland is that it is an area of settlement, productive and relatively free from internal barriers, but possessing not a single line of communication important to the outer world.

In each of these relations there are two things related; Man travelling or settling, and Nature, and each member of the couples is variable. History is the record of part of Man's variation, Geology that of part of Nature's. Yet for the purposes of political geography Nature may be regarded as invariable, when compared, that is, with the short kaleidoscopic evolution of human arts.[1] Thus the resistance offered by a given feature to man's movement, or the facilities of a given area for his settlement, are for ever varying with the state of his civilisation. In applying geography to the lighting up of history, the physical features may, as a first approximation, be treated as constant, rock-like; around them the human flood surges and rests, ebbs and flows—now calmly contained in its basin, now sweeping over, bursting through, or wearing away the obstacles. We can imagine a time, though we do not know of it, before paddles, before oars, before sails, when all movement was on land and the sea an absolute barrier. Then came an age of coasting, when the high seas, however, still defied the ancients, though not because of their glue-like consistency as the impotent mariners would have it. With the compass the resistance of the ocean fell, and it continued to fall until, at the beginning of this century, all the shipping arts combined to give water so trifling a resistance as compared with rock that men took it inland in canals. Then suddenly George Stephenson almost reversed in this respect the whole current of history. The resistance of water continued to fall, it is true, but that of land fell so out of all proportion that it is now lower than that of water. Where men used to come from the East up the Adriatic to Venice, they now pass to Brindisi, and by land up the long peninsula of Italy. They will soon go from London to India by land; they have gone recently all the way by ocean. Thus, while the mountains change their form almost imperceptibly in long ages, a daring leader, a mechanical discovery, a great engineering monument, may revolutionise man's relations to geography in the third of a generation. The suddenness with which the results of these revolutions become apparent is far more marked as a rule in the case of man travelling than man settling. Roads, even main roads, are far more easily abandoned than settlements. Once on the move, we have but to swerve from the beaten track to accom-

[1] It is not here intended that Nature has not changed in historic times, but only that the changes undergone by social Man have been vastly greater than the great changes of Nature in the same time. The mode of thought appropriate to this subject is that known in mathematics as the method of successive approximations.

plish the change : there is some resistance even to this, but nothing to be compared to the inertia with which men cling to old settlements. Witness the beggar population of decayed cities. Love of home, love of family, want of imagination, want of knowledge, want of means, want of energy, combine to keep men stationary. To human inertia must be added, in modern days especially, the inertia of capital. Even if we grant that with present conditions Milford Haven is a better terminus to the trans-atlantic ferry than Liverpool, the fixed capital of Liverpool would impede change until, with the change of conditions, the advantages of Milford Haven became overwhelming. So, too, it may be that the balance of geographical advantages has already inclined against England, and that she is maintaining her position by inertia—by the difficulty attending the removal of the men, the capital, the skill, and the traditions accumulated here as the result of past geographical advantages. We may sum up this stage of our discussion by saying that while political geography investigates the relations between Nature and Man, travelling or settling, that while man's modes of travelling and settling vary often suddenly, and therefore his relations to Nature vary as suddenly, yet these changed relations do not always find immediate geographical expression owing to what we may call geographical inertia, the tendency of settlements and the less tendency of roads to remain fixed.[1]

A distinction, however, must be drawn among settlements. Paradoxical as it may seem, some settlements are more dependent on movement than on settlement. This is notably the case with some of the concentrated settlements known as towns. The point is easiest shown by a pair of examples. Ireland is a productive pastoral land, with a fairly dense population evenly distributed over its surface, with a great number of villages and small country towns, but with no great centres of population, except at half-a-dozen ports, where men and goods converge to enter and to leave the island. This is a true area of settlement based on the productivity of the land and independent of roads. Southern Bavaria, on the other hand, is a relatively barren inhospitable upland with a sparse population, and yet it contains at least four great historic cities, Ratisbon, Munich, Augsburg, and Ulm. Great and important to-day—in the past still greater—these cities have not grown rich on Bavarian produce. They are nodal points on through lines of traffic from the north to the south, from the east to the west of Europe. The expression "nodal point" is a convenient one. A nodal point occurs wherever there is a congestion of traffic on a road, at a ferry or a bridge, at the mouth of a gorge, where two roads cross or join, at a changing place of vehicles whether from pack-horse to ship, railway-truck to steamer, or river-barge to sea-going vessel. Wherever, in fact, traffic is delayed or is swollen, there is the proper spot for all the trades that wait on the traffic to fix their abode, the publican and the shoeing-smith at the four ways in the country, the merchant and the docker at the place of transhipment or assortment. This does not pretend to be exhaustive of the causes of towns. It is only

[1] Inertia, it must be remembered, implies not only difficulty in starting movement, but also difficulty in arresting or changing already existing movement.

true of a great number of towns that they are incident to man's travelling. Others are the market centres or administrative centres of productive areas, the results of the settlement of socially organised man.

The distinction between man travelling and man settling must not be treated in a narrow spirit. It is not intended as a tool for the rote-workman. In all but the most elementary organisations of society travelling and settling are intricately related. The precise value of the contrast as a method of geographical analysis will be best gathered from examples. I have time only for one, but that on the greatest scale.

If we look at a physical map of the Old World, we shall notice that the greatest land mass is crossed in different directions by a belt of inland seas and a belt of deserts. If we further consider a map of the same region on which the density of population is indicated approximately by depth of tinting, we shall have our attention drawn to the fact that there are two great regions densely populated, Europe and South-Eastern Asia. We are to deal with the relations of these three phenomena. The belt of deserts lies between the two deeply tinted populated areas, separating them. The belt of seas—the Mediterranean and the Red Seas—crosses the desert belt diagonally, and, were it not for the Isthmus of Suez, would form a water road connecting by almost the shortest line the two populated areas. Let us now make a closer examination of each of the three features. First the settlements. The western (European) area may perhaps be spoken of physically as the Gulf-stream region—that is a district blown over by prevalent west winds fed with warmth and moisture from the warm surface waters of the Atlantic. It is largely this influence which has made so northern a region so highly favourable to settlement. Historically this is the Roman world. Its morals, its law, its religion, its traditions, much even of its languages, are legacies from Rome. Its states, though independent, form a system held together mainly by the common Roman factor. Physically and historically, then, we are dealing with one great area of settlement. Its boundaries are not, however, quite coincident with those of Europe, for Barbary must be included in it, and all but South-western Russia must be excluded. The inclusion and the exclusion are on physical and historical grounds which are obvious. This Gulf-stream Roman area of settlement has 300 million inhabitants.

The South-eastern Asiatic area is suited to settlement because moist and hot, because therefore rich in vegetable products. The moisture is brought by the monsoons from the tropical ocean. Hence physically it may be known as the Monsoon-area. Politically its unity, though not so marked as the Roman unity, will perhaps justify the expression Indo-Chinese. It extends from India to Japan. It has 700 million inhabitants.

Thus these two areas contain together 1000 million people, two-thirds of the world's population. The products of the two regions are as different as their climates. The civilisations of the two communities differ in every detail. The differences are a measure of the number of new commodities, new ideas, even new men, which one has to offer to the other. The vastness of the populations is a measure of the demand for the commodities, ideas, and men, once the supply is made known.

Both together, difference of products and vastness of populations, measure the necessity of communication between the two areas of settlement. History is to a great extent one long comment on the importance of the East and West trade.

Now turn to the facilities for travel from the one area to the other. The two are held apart by the great desert belt. Indeed they are two, not one, *because* of this belt. True, the desert contains small areas fit for settlement—oases, river-valleys, "curtains" of mountain chains—but as a whole it is not an area for settlement. It is a barrier of very high resistance even to travelling man. It extends as the Sahara from the very shore line of the Atlantic until it ends as the Gobi, almost on the confines of Siberia. In the west it is a more effective barrier than the sea itself. Despite the Mediterranean, Barbary is European in flora, fauna, men and history, not a member of Negroland. The lines of least resistance through these deserts must clearly be geographical features of first-rate importance. Were it only complete, the belt of seas which we have mentioned crossing the desert belt would rob the deserts of half their severing power. Actually the communication is broken by the Isthmus of Suez. All history would have been radically different but for Suez. It is the most important spot on the face of the earth. It owes its power, however, not merely to its land-character, but to the north wind which blows persistently down two-thirds of the Red Sea, and which almost defies the mariner to make the passage up the sea. It required the modern combination of canal and steam definitely to reduce the obstruction.

The sea road was, then, for long ages, largely closed. So much the more important the remaining lines of low resistance. They are few, definite, and of two types—either rivers struggling through the deserts from well-watered source-lands, or else what Orientals term "curtains of the mountains," strips of green country at the mountain foot and parallel with the range, nourished by the moisture which in these lands only mountain-crests can wring from the winds. Of the former class we have the Nile, the Euphrates and Tigris, the Oxus and Jaxartes. Of the latter we have chiefly the roads which follow the Arabian mountains near the Red Sea shore and those which accompany the northern and southern Persian ranges.

The men who dwelt on the oasis-roads from east to west formed naturally the first commercial peoples. Babylonians, Phœnicians, Jews, Arabs—they were chiefly of one race; and may we not trace the hereditary commercial aptitudes of that great Semitic race to the necessities and opportunities of their remarkable position? While the peoples of the oases took a toll of the East and West traffic, and hence were some of the first to grow rich and civilised, their existence had another curious effect on the world's history. They drew a veil between East and West which heightened the effect of the desert. To borrow a simile from physics, this veil was transparent to things, but not to ideas. Silk passed from Chinese hands to Desert hands, and from Desert hands to Roman hands but all that Greeks and Romans knew of China was summed up in its name, Serica, the silk land, and that a name unknown in China. It was because the West nowhere touched the East, because Western know-

ledge of the East was only hearsay, because the West in a word looked at the East through a glass darkly, that old writers could place in the Indies what were in effect the fairy tales of the Middle Ages. Such rays of coloured light as now and then struggled through only served to stimulate imagination. We moderns have discovered the world, but we have lost the geographical stage of romance. We cannot yet measure the loss. What a part these Desert, or better, Oasis peoples have played in the world's history! What do we not owe to them directly or indirectly in commerce, science, art, romance? Do not the characteristics of their homes throw a flood of light on their nature and development?

It was the overthrow of the oasis civilisations by the Turks which precipitated the greatest revolution in history. The Turks were to the Desert what the Teutons were to the West. In each case a barbaric flood overwhelmed an ancient civilisation, the toilsome growth of ages. But while the Teutons came down on one end of the inhabited world, leaving it free to be slowly penetrated again by Byzantine and Saracen light, the Turks broke the slender links between East and West. They broke them, too, just when they had become indispensable to the West. The Crusades had made Eastern luxuries necessities to re-born Europe. The West, full of the energy of new youth, fired by recovered knowledge and recovered religion, set itself to find new roads to the Indies—ocean roads, not desert roads. Columbus sought the Indies by the west, Magellan by the south-west, Da Gama by the south-east, Cabot and Davis by the north-west, Barentz and Chancellor by the north-east, Henry Hudson by the north over the North Pole. In thirty years the broad features of the world were revealed. Ever since, geographically, politically too, we have but filled in what that great age sketched out.

Are we not justified, then, in saying that the greatest events in the world's history, ancient, mediæval, and modern, are at least related to the greatest features of geography? The twin character of the world's civilisation, Roman and Indo-Chinese, is based on the two areas for settlement severed by the vacant desert. The narrow paths through the waste, the same in all ages, are the homes of the oasis peoples, small in number when compared with eastern and western hundreds of millions, yet at once the intermediaries and the obstructives between East and West. Here is the grandest contrast between man settling and man travelling, between true settlements and settlements chiefly ancillary to travel.

My time is up. I might give many more examples. That which I have given is a large one, implying the knowledge of few details of physical geography. It may, however, I trust, suffice to show that there are higher flights for the political geographer than the mere mapping of frontiers and detailing of statistics. Humdrum detail is the greater part of every science, but no science can satisfy the mind which does not allow of the building of palaces out of its bricks. In this sense it is often said that the physical geographer and the historian may exist, but not the political geographer. Yet I venture to say that his (the political geographer's) is the crowning chapter of geography. He requires physical geography as a preliminary—what the Germans call a *Hilfswissenschaft*, we more clumsily an auxiliary science. He takes a different view of

history from that of the historian proper. The latter has not time or, as a rule, aptitude to gain the necessary steeping in physical geography. Political geography has in this sense a distinct service to render both to history and to politics. Cannot the "must be" suggest a solution of the "has been"? John Richard Green showed us how to use this implement where other evidence is wanting or weak. Even where evidence of events is strong, evidence of causes is often weak. Even where all is clear—and how rare this—causes and effects, some of the causes must be intricately geographical. And in politics, how small does current diplomacy seem, if we realise to the full how deep are the ruts in which a nation's course is run. The course of politics is the product of two sets of forces, impelling and guiding. The impetus is from the past, is the history imbedded in a people's character and traditions. The present guides the movement by economic wants and geographical opportunities. Statesmen and diplomatists succeed and fail pretty much as they recognise the irresistible power of these forces. This analysis is our only key to the future. In an age when democracy has ultimately to guide policy—though, busy earning its living, it has no time and little opportunity to study current diplomacy—broad principles can alone keep it right. The geographer has to help in stating these principles. The task is a vast one: perhaps to those absorbed in the close study of details even a distasteful one, certainly one bound to lead to falls, to lead to truth only through repeated error. This is a great ideal, some will think too great, but there is room for all. We may stop short in the reasoning at whatever stage we, each of us, will. Our highest ideal is attainable only to future generations, and none the worse for that.

## AZERBEIJAN.

THE following is the substance of a Report, presented to the Anthropological Section (Section H) of the British Association, of a Committee appointed to investigate the habits, etc., of the nomad tribes of Asia Minor, as well as to excavate on sites of ancient occupation. The subject has additional interest just now when we hear a good deal of the misdoings of the Kurds. The report, drawn up by Mr. J. Theodore Bent, is the result of a journey recently undertaken, and deals with the district known as Azerbeijan, which, as Mr. Bent describes, is bordered on the west by Lake Urmia, on the south by Kurdestan, on the north by the Russian province of Transcaucasia, and on the east by the Persian province of Irak Ajemi. Azerbeijan represents the ancient Atropatene, the kingdom of Media, and is composed of vast, and in many cases inaccessible, mountain ranges, overrun during the summer months by tribes of Kurds, Tatar-Turks, and Arabs who come up from the burnt-up districts of the Germ-seer to find pasturage for their flocks. The low-lying ground around Lake Urmia, Urumia, or Lake of the Armenians (Darya i Armeni), as the Persians call it, has a settled population, inhabiting such towns as Maragha, Binab, Mianduab, Urmia, etc., con-

sisting of a mixed population of Persians, Tatar-Turks, Armenians, Nestorians, and the remnants of the ancient race of the Chaldeans.

Starting from the frontier of Persia proper, the first place where the Tatar-Turkish language is spoken is Zenjan, beyond which, separated by several mountain ridges, is Gul-tepe, the site evidently of an important town of the Median period, where gold has recently been worked, but without satisfactory results.

The mud villages inhabited by the Afshah and other tribes closely resemble one another. They are principally conspicuous for certain round constructions standing about 15 feet in height, and built in the form of a dome. These are made of dried cakes of dung, and are the only fuel used in the district. Each house has one, and the cakes are made by spreading the dung of their animals on a flat space before the house, mixing it with mud, and when it has assumed the desired consistency they plaster the cakes on to the walls to dry, and then build them up into the round structures called *kusks* or kiosks, and the fuel is called *bardans*; women are generally employed in making this kind of fuel. Over the houses of most of the inhabitants may be seen the skulls of horses or donkeys, placed there to keep off the evil eye; and on entering the village we interrupted a Passion Play of the most primitive description. Many *gelims* and namads, or carpets, made by the tribes, were spread over the chief place of the village, the performers, dressed in coats-of-mail and brandishing the daggers and weapons commonly found amongst them, performed the play of Hussein and Hassan; whilst the male spectators wept as if their hearts would break, and the women uttered screams of distress. After the happy *dénoûment* they all got up, and with hands spread towards Kerbela, thanked Allah for mercies vouchsafed. I have seen these plays often in Persian towns, but never with the intensity of feeling and passion shown amongst these wild mountaineers. The collection of individuals at the play gave us an opportunity of noticing the principal features of the inhabitants. Their eyes are small, they have high cheek-bones, their beards thin and straggling, and their frames very robust.

Outside the village is the graveyard, in the centre of which is a tiny circular tomb of mud over the body of a Seid, or holy man of the tribe. On either side of his tomb were poles for decoration at the annual festival of the Moharram. The Afshah tribe belongs to the Shiah faith, as do most of the Tatar-Turkish tribes, whereas their hereditary enemies of the Kurdish tribes are almost universally Sunni. At funerals they generally take the riderless horse of the deceased to the grave.

About 4 miles from Dehshir, at the village of Tschaierli, we commenced the ascent of a very high pass, and then descended into the bed of the Kizil-Uzen river. This pass is called Ali-panj-Angusht, or The Five Fingers of Ali, from some peculiar pointed rocks which are greatly venerated by the tribes; and all around were little piles of stones placed by passers-by in token of respect, the same idea commonly seen throughout Persia, for whenever travellers come within sight of some sacred shrine they add a stone to the many piles around them. There are several villages on a plain of considerable fertility, by the banks of the

Kizil-Uzen river, Dooskhandi, or salt-diggers' village, so named from the fact that rock-salt is obtained from the mountains behind. The Kizil-Uzen is one of the most important rivers of Media, rising in Mount Zagros, in Kurdestan, and after a meandering course of about 490 miles, flowing into the Caspian. It is supposed to be the river Gozan (2 Kings xvii. 6), and is certainly the most important stream between the Caspian and the lakes of Urmia and Van. We crossed it with considerable difficulty, owing to the swollen waters, at the village of Bagtash, and then ascended by the side of a stupendous gorge to a level plateau covered with horses and animals belonging to the tribes, enjoying a rich pasturage. The horses are mostly bred from Arab sires, and with the rich pasturage become very fine specimens.

At the village of Savandi, Mr. Bent being accompanied by his wife, they were able to prescribe successfully for the wife of Kerim Khan, the chief of the important Shah-Savand, *i.e.* 'Friends of the Shah' tribe (a title given in return for their support by the great Shah Abbas), and they had thus the opportunity of learning a good deal of the constitution and affairs of the tribe. The chief is usually made a Khan by the Persian process of sending him a coat-of-honour and other dignities, for which he has much to pay. He remains with his people, but he has a vakeel or representative at Court, generally a son or near relative, who combines the office of transacting business with that of acting as a hostage for the good behaviour of his tribe. Any man of rank in the tribe can demand a council of the elders or white-beards; the mollahs or priests expound the law at these assemblages. The office of chief, called the 'pir' or elder of the tribe or 'eel,' is hereditary, and the 'pir' generally traces his descent from some holy man, whose worship is general throughout the tribe, and called the Ojak; his tomb is generally in some well-known spot amongst their summer haunts, and an object of great veneration.

Each tribe has its recognised district and lines of demarcation of pasturage, which have been observed from remote ages, and are visited summer after summer by the flocks with unceasing regularity. In the district through which we travelled the Afshah hold most of the pasture land, and are very jealous of the encroachments of the Shah-Savand, who occupy their pasturage only by a very recent tenure. Concerning right of pasturage constant blood-feuds arise amongst the shepherds, resulting in the extermination of whole families.

At the next village of Ghar-dere we first made the acquaintance of the underground houses, where the nomad tribes usually reside with their flocks during the winter months. These *zirder*, as they are called, are of different kinds: here they are detected only by mud domes with holes at the top, over which the road passes, and at the top of which the village-life is carried on. Not unfrequently accidents happen, and a donkey or horse descends through the ceiling on to the family below. On the plain of Mianduab, to the south of Lake Urmia, they are of a different form, slanting roofs appearing above ground, made of thatch. You descend into the rooms below by a sloping path; here you see the rooms, cupboards, and shelves (*tarcheh*) all hollowed out of the ground, but having seen one is quite sufficient, as you reach the surface one mass of fleas.

The chief of the village, Sarmas Beg, gave us up his house, a miserable mud tenement consisting of two rooms. The climate at this elevated spot was intensely cold and wet, even though it was in May, and for fuel we had nothing but the dung cakes which I have already described. Sarmas Beg had three wives and seven stalwart sons, who always rode out to protect us when we went out, and performed for us many of the Kurdish horseback games. One, the 'bazi,' consisted of riding at full gallop in twos or threes before us, with lances poised and trembling as if for casting; then, at the word of command, they executed a sharp turn and charged back again. Then they did for us the Kaygatch, or shooting at an object with a gun when at full gallop. The dexterity they displayed at shooting backwards when in the saddle and at full gallop, reminded us forcibly of Xenophon's accounts of the skirmishing capabilities of the Parthian archers. All Kurdish games are wild, *e.g.* beating with a rope at any one who tries to catch an individual placed in their midst, or dragging by the leg a man tied to another, who tries to touch one of his opponents without letting go the unfortunate victim. But what interested us most at Baba Nazeyr was studying a peculiar form of religion which is common to many of these wandering races; and, though our material for this study was collected at many other points, I cannot do better than set it all out here.

By the Persians these people are called the Ali-ullah-hi, or sect who affirm that Ali, the son-in-law of Mahomed, is God; they call themselves 'the friends of the Seid,' or followers of Nazeyr, who is said to have founded this religion. One of the great centres of this religion is Genjabad, the village we passed through before reaching Baba Nazeyr, the name of which place I have little doubt is derived from their prophet, one Imam Kuli of Genjabad, who is reported to have dreamt that a landslip would destroy part of the village, which came to pass, and by reason of his prophecy many were saved. Each community of Ali-ullah-hi has a Seid, who presides at their secret meetings, held in a room in the village. They have freemasonry signs by which they know each other, and, like the howling dervishes, they are great at fire-eating and other horrible tricks of juggling. These meetings, or *zikker* as they are called, are curious, inasmuch as they contain many elements of Christianity. Each person as he or she enters kisses the hand of the Seid and takes up his place at the right of the last comer. A sheep is killed and roasted whole; it must be without blemish, and its horns and hoofs are first taken off: the man who cooks it must not taste it, and when all are assembled it is brought in, and the Seid distributes portions of it to each, each person's share being equal, be he great or small. They have, too, a form of baptism, and pass children through fire, and at their assemblages they have cups of wine handed round. They have no mosques, only sacred tombs, where their Seids are buried, places where they say the holy light has come down, which, together with their worship of fire, connects them with the ancient Zoroastrians who lived in this district.

Their tradition is curious. Nazeyr, they say, was Ali's representative on earth; seven times was he killed by Ali, and seven times was he brought to life. Mahomed they assert to be God; Ali, his son-in-law, also a

part of the Godhead, who was sent to earth to convert people from their evil ways: and on his return to heaven he left an incarnation of the Deity always on earth, which incarnation is represented by Nazeyr and the succeeding Seids.[1]

About a mile from Baba Nazeyr are the ruins of Takht-i-Suleiman—ruins of doubtful origin, but probably dating only from the Seljukian period; they are situated in a very fertile hollow amidst the mountains, and are remarkable chiefly for a pond in the centre, which in overflowing petrifies all around it, so that excavating we found practically impossible. Close to it is a conical hill 200 feet high, with a hole a quarter of a mile round, sinking to the depth of the hill and formed by the same action of water which has since found another outlet, presumably the one in the centre of the ruins of Takht-i-Suleiman. A lofty mountain near has a fortress at the top, but owing to the depth of snow we were unable to visit it; this is known as Takht-i-Bulgais or Belkis, Bulgais being the name for the Queen of Sheba. The legends of Solomon in these parts are very curious. The ruins themselves are called Solomon's throne; a curious long petrifaction which runs across the valley is supposed to be a serpent turned into stone at Solomon's command. The hole in the mountain is called Solomon's Prison, and the ruins of a building are known amongst the peasants as Solomon's Bath; these ruins are favourite summer quarters for the tribes with their flocks, and on casually asking their ideas respecting Solomon I was seriously told that inasmuch as Solomon was the wisest of mankind, of course he chose the best spot in the world for his residence: in summer-time this may be true, but when we visited it the cold season was hardly sufficiently over to enable us to indorse this opinion.

At Baba Nazeyr we were joined by Mahomed Hussein Khan, the third son of Haidar Khan, the chief of the Afshah tribe, together with a large retinue, who had been despatched to conduct us safely through the dangerous country which borders on Kurdistan. Haidar Khan apologised that his health would not permit him to come in person, but he sent us presents of a lamb, several loaves of sugar, and packets of tea. Some of these we distributed to our host, and we were much struck by the graceful way in which the Kurdish chiefs received the presents. They first kissed them, put them to their forehead, and then bowed; presently they brought us in return presents of cream, bread, and cakes, and on my wife saying that the bread was the best we had eaten on this journey, Sarmas Beg's son put his hand to his heart and bowed like a Parisian.

On leaving Baba Nazeyr, Sarmas Beg and his sons, with the long lance, accompanied us for several miles, the old Persian custom of *istikbal*, to speed the parting guest, and then they took farewell of us with many

[1] Mr. Bent "hazards a suggestion" of much interest, viz., that these people are one of the decayed Christian sects of this region, who, to avoid persecution, have substituted the name of Ali for that of Christ. As, however, he adds that "the very name of Nazeyr is suggestive of Nazareth," we may point out that Nazeyr (more properly El Naṣir, the Helper or Defender) is a title applied to Ali, and Naṣiri to a follower of Ali—*i.e.* of Ali exclusive of the other Imams. His "Baba-Nazeyr," we venture to think, should perhaps be Bab-en-Nazeyr.

protestations of good-will, and we were handed over to the protection of Mahomed Hussein Khan and the Afshahs. At the village of Akbulak our new protector had ordered a sumptuous repast to be prepared for us in the house of a relative, consisting of a large tray groaning under a weight of pilau, kabobs, meat prepared with prunes and rice, thickened cream, mast or curdled milk, fried eggs, sherbet in a blue bowl, sour milk, and bread wrapped up in a handsome cloak. He then conducted us to the village of Paderlu, inhabited by Afshahs, and close to a curious natural phenomenon—a floating island in the centre of a small highland lake. This floating island is called Chamli-gul, or the meadow of water, and consists of a thick mass of roots and reddish clay about 40 feet by 60; the thickness of the island at its edge is one yard and a half, and it moves from one side of the lake to the other according as the wind blows, approaching the edge of the lake so near that we could easily jump upon it. It is all covered with grass and reeds, and in the summer is a favourite pasturage for flocks. The lake itself is very deep, far deeper than I had any means of fathoming; it is surrounded by rich marl hills, covered with green, and backed up by the stupendous range of Sehend. During our stay at Paderlu the island changed its position four times.

The Afshahs of Paderlu have a bad reputation, and we were thankful to be under the immediate protection of their chief. They are all shepherds, and possess a fierce race of dogs to keep off the wolves. We had an opportunity here of seeing how expert these people are in treating mud, mixed with dung, and bringing it into use for most purposes. Besides the kusks, or fuel domes, before alluded to, and on the top of most of which storks had built their nests—called here *Hajji laclacs*, from the general idea that they always go to Mecca during the winter season—they make beehives of the same material, long barrels, which are stuck into the walls of houses, the inner end projecting into the apartment, and stopped up with a cake of dung; to take out the honey, the owner makes a noise in his room, drives out the bees, removes what honey he wants, and claps on another cake of dung; then, again, bowls for household purposes are made of it—in fact, it supplies everywhere in these parts the place of wood, which is exceedingly scarce in these treeless mountains.

Their chief food is *mast*, or curdled milk, and bread; on the tops of the houses we noticed many round white balls, which are made by pressing the curdled *mast*, mixing it with salt, and making a sort of very coarse cheese. The peasants in these villages eat little else. Outside the village we found that in the graveyards the tombs are covered with slabs made of the same mud-and-dung preparation. Most of the tombs are empty, for the wolves of the neighbourhood seldom leave the bodies long in the graves.

A two days' ride from Paderlu brought us to the Kurdish village of Gouar-agatch, and for some time we found ourselves in quite a different element. These Kurds are purely agricultural, and belong to the *Jass* or race of wandering Kurds. Their women go about with uncovered faces, they are a fine, handsome race, dark hair, high complexion, and

large noses; their faces are all tattooed, and their heads hung with all sorts of ornaments, cowrie beads and savage jewellery. The women wear large, baggy trousers, and heavy headdress, and a loose red dress.

Everything here shows a tendency to superior art. Stone is introduced into the construction of the houses—a relief after the many mud villages we had passed through of the Afshah tribe. Red ornamentations made with henna adorn the doors and windows, and the construction of the compounds is interesting; by a low wicker gate you enter a courtyard, this gate being covered with dung cakes; an outer covered shed contains the tripod for hanging the skin on for making 'mast,' and the blacksmith's bellows, with double funnel, ornamented at the top and at the bottom, having feet formed like birds with beaks; the family rooms open into this shed; they are only lighted from the roof, reek with smoke, and are full of great store cupboards for grain, also made of dung and mud, and ornamented with rosettes and other patterns. There are many elegantly-shaped waterpots, made of a clay found close to the village, where we found the women busily engaged in digging; any number of quaint-shaped copper utensils for boiling milk stood around a caldron; and several dark, handsome women, with two dark tufts of hair on either side of their faces and wearing round fezzes bound to the head by red handkerchiefs, with noses pierced for silver solitaires, were busily engaged in preparing the evening meal.

The home-coming of the flocks at evening was interesting. At a given spot outside the village crowds of women and children were assembled at the hour appointed, and when the bleating was heard, each one rushed forward to seize his own, wildly screaming and creating a perfect pandemonium of noises. Children of five were left in charge of two or three kids as large as themselves, for the Kurd begins early to make himself useful. The Kurds are nearly all Sunni, and we were shown the village mosque and bath—a thing unknown in the districts of the Shiah faith.

On the following day we rode over a mountain-pass, with rich moorland scenery, amongst the mountains of Kurdestan, with acres of fennel growing where in England we should find bracken; a dervish is seated at the highest point begging alms, for many pilgrims pass over this road on their way to Kerbela. The ground gradually descends towards the level of Lake Urmia, and we begin to pass encampments of nomads on their way to their summer quarters, the poorest of them being armed with guns and daggers, for this part of Kurdestan on the border of Azerbeijan is exceedingly dangerous, and the scene of frequent feuds; blood-feuds are perpetual, which end in the extirpation of whole families, and there is no Government here to keep them in check. The tents of the nomads are black, of thick goats' hair, with tufts at the top; the walls are of matting, to allow of a current of air during the summer heats, before the tents boil caldrons of milk, and there is always the tripod for making *mast* by vigorously shaking a skin suspended from the centre. As they travel, their cavalcades are most amusing to watch—on one cow is strapped its lately-born calf, another cow carries two or three kids, and perhaps the mother goat, who has just been confined; other cows

carry the tents and poles, with men perched on the top; the donkey is laden with the household utensils, on the top of which are tied the cocks and hens. The women generally walk, and the young and active go before with the flocks; thus they march day after day till their summer quarters are reached, up in the vast mountain range of Sehend.

We arrived in the afternoon at another Kurdish village called Sinjate, favourably situated in a gorge, and surrounded by many Sinjid trees, from which presumably comes its name. The Sinjid or jujube tree is a common one in most of these villages; it resembles the olive in foliage, and its date-like fruit is a common means of sustenance amongst the inhabitants; it is sweet but very woolly and disagreeable to eat.

Here, again, many amusing scenes of Kurdish life were brought before our notice in our compound. We entered one room and found several women seated on their haunches around the heated *tanúr* or oven, made of a large earthenware jar and stuck in the ground; it is heated with brushwood and connected by a flue with the outer air. At Sinjate the women wore an immense number of cowrie beads, their caps and aprons being trimmed with them, and even bracelets made of them. They were busy making bread after the following fashion:—One woman makes the dough into balls the size of her fist, this she beats with her hand into flat cakes, about a half-inch thick and ten inches across. This she hands to the chief bakeress, who presided over the *tanúr*, and who, by some mysterious legerdemain, merely by throwing the cake from hand to hand, expands it to a thin oval sheet, the thickness of paper; this she deposits on a very dirty pillow, one end of which is open to let in her hand, and thus poised she dashes it against the heated side of the *tanúr*, and when it is baked to her satisfaction she removes it with two sticks.

The village of Sinjate is one vast expanse of mud-roofs, over which we could wander from end to end. The inhabitants were very civil in showing us their houses, and the women always greeted us as we passed by, holding up their hands.

Just below Sinjate we joined a considerable stream, which is the source of the Checkatoo, a considerable river flowing into the southern end of Lake Urmia, and after a few hours' ride along its banks we reached Sain-kala, a considerable village around a mud fort on a hill; this place acts as a sort of capital for the Afshah tribes, who frequent the neighbouring mountains, and here Haidar Khan holds his court during half the year, but unfortunately he was absent just then; however, we were comfortably lodged in his house, and took the opportunity of resting for two days after our tedious journey through the mountains. Sain-kala boasts of a little bazaar, where we were able to obtain several much-needed commodities, but it is a most desolate spot, having been entirely ruined during the invasion of the Kurds a few years ago under Sheik Albidowleh; the wild tribes under his leadership overran most of this district and did irreparable harm. Sain-kala from its position is a place of considerable strategical importance, inasmuch as it commands the entrance into Eastern Kurdestan, by the way of the source of the Checkatoo, down which we had come.

After leaving Sain-kala, at the distance of a few miles we came across

a very interesting place and an interesting tribe. This is Mahmoud-Jute, where Norooz Khan, the head of the Chehar-dowleh tribe, lives in almost regal state.

The Chehar-dowleh is a small tribe, but has a great reputation for bravery; originally they came from the south of Persia, but were transplanted to the neighbourhood of Kasvin by Fatteh Ali Shah, the grandfather of the present sovereign; Mahmoud Shah, Nasr-ed-din's father, again transplanted them to the banks of the Checkatoo, and here they have flourished exceedingly.

Norooz Khan, their chief, was the only one in this neighbourhood who succeeded in keeping back the Kurds from his district, consequently his castle and village of Mahmoud-Jute was the only one we passed through in this district which did not show traces of the ravages of war. Here he lives, and may almost be said to be an independent sovereign; for though he wears the uniform of a Persian general, yet he refuses to pay any taxes, refuses to go to Teheran, and exercises regal authority over his small kingdom. He received us graciously in his large palace, with a lovely reception-room or *talya* with a view over the rich valley of the Checkatoo and Kurdish mountains. Around the palace, which covers two acres or more with its buildings and gardens, runs a mud wall with innumerable bastions, on the top of each of which a stork has built its nest, as also they have done on every available vantage-ground, so that the whole place is alive with these sacred birds—a sure sign of peace and prosperity.

Norooz Khan told us much about his tribe; he owns, he said, 2000 houses, and he has about 5000 rayats or dependants, his territory stretches from Sain-kala to Mianduab, and his subjects are chiefly sedentary and engaged in tilling the fertile valley of the Checkatoo; though there are several nomad families who dwell in the villages during the winter months and go up to the *yaila* or mountain pasturages during the summer. The legend in the tribe is that once they beat a combined force of four other tribes and took the name of 'four governments,' Chehar-dowleh, but this I should imagine to be a fable; from their physique and also South Persian origin I should imagine the tribe to be of Arabian descent. Norooz Khan himself, with thick lips and stunted stature, might have some negro blood in his veins. His meal was excellent, served up for us on a table whilst the others ate on the floor, and performed feats of wonderful dexterity in feeding themselves with their fingers. All around the palace are mud houses and underground abodes: there is also a bazaar, and a general air of prosperity about the place.

The banks of the Checkatoo, especially as Mianduab is approached, are very fertile. At the village of Karyagdeh we first came across a wheeled vehicle consisting of a cart, a triangular plateau 15 feet long, at the apex of which buffaloes are fastened, the whole supported by an axle joining two wheels without spokes, in many instances plain, circular pieces of wood; for threshing corn they use a spiked cylinder attached to a pole which is drawn round and round by buffaloes, and acts the part of a flail. Buffaloes are here in constant use; they wallow and swim in the river, and naked urchins may be seen washing and scraping their

backs to prevent a cutaneous disease to which these amphibious animals are very liable if not properly cared for. The valley of the Checkatoo produces tobacco in small quantities, corn, and castor-oil—this latter commodity is used here for lamps and all household purposes. In each village there is a large stone, generally an old gravestone, put up near the mosque, which is public property, and where women take their turn in bruising the castor-oil pods for their use. By the side of the river, where there is no cultivation, we passed the tents of several nomads, waiting here with their flocks for the season to go up to the mountains. Before the tent of the chief stands the lance, the emblem of authority, reminding one forcibly of Saul (1 Sam. xxvi. 7) sleeping in his tent with his spear stuck in the ground at his bolster. The family here is the basis of society; the chief is the head of the family. They are strong, powerful individuals, capable under a good government of great development; and could Turkey or Persia ever reform its ruling classes, they would find the wandering tribes a new and powerful backbone to the nations.

By the banks of the Checkatoo, north of Mianduab (which, by the way, means the place between two rivers, the Tatoo and the Checkatoo), there are many curious underground villages inhabited by the nomads in the extreme colds of winter, the thatched roofs of the houses alone appearing above ground: they again reminded us forcibly of Xenophon's account of this part of the world, when returning with the Ten Thousand through the wild mountains of the Karduchi or Kurds. 'The houses are underground,' he says, 'the mouth resembling that of a well, but spacious below; there is an entrance dug for cattle, but the inhabitants descend by ladders.'

On crossing the Checkatoo by a boat shaped like half a barge, we came across a large plain running between the Sehend range and Lake Urmia: the inhabitants here are chiefly sedentary members of the Afshah tribe, with very fertile gardens around their villages; most of them keep pigeons for the dung, which is used in the production of melons and other fruits, pigeon towers being almost as conspicuous objects here as they are in the neighbourhood of Ispahan. Kurdish ravages are everywhere visible in the shape of ruined villages and fields neglected. Before reaching the town of Binab we tarried to lunch in a mud fort erected by one Khaleel, in which the scattered inhabitants of a neighbouring ruined village are gradually collecting and making for themselves mud huts. They call the place Khaleelevan, and as for the traces of their old homes they will soon be obliterated.

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## COLONEL SIR HENRY YULE, K.C.S.I., C.B., LL.D., R.E., ETC.

(*With a Portrait.*)

THE last day but one of the old year took from us Colonel Yule, a loss which geographers of all countries will mourn, for their science never had a truer friend or an abler advocate. Born on May 1st, 1820, at Inveresk, near Edinburgh, where his father resided, Colonel Yule came from the class of yeoman-farmer or small proprietor, and his ancestors had

been settled for upwards of two centuries in East-Lothian.[1] But his father, Major William Yule, had served in the army in India; and his two brothers, Sir George Udny and Major Robert Yule, both distinguished themselves in that great dependency of the British Empire—Sir George as an able and popular civilian and a noted *Shikari*, while Robert fell at the head of his regiment, the 9th Lancers, before Delhi, in one of the battles of the Indian Mutiny.

After receiving his first education at the High School, Edinburgh, and elsewhere, Henry Yule went to Addiscombe, that school which has produced so many heroes, and passing out first of his year, entered the Bengal Engineers in 1838. After the usual preparation at Chatham, he proceeded to India, where he arrived in 1840, when the British forces were engaged in the first Afghan war. Yule was not sent to the front, but his first important employment was in connection with canal works under Captain (afterwards General Sir William) Baker, a chief for whom he cherished a life-long regard. It was in the Sutlej and Punjab campaigns that Yule's first experiences of actual warfare were gained, and for these he obtained the medals for 1846 and 1848.

On the outbreak of war with Burma in 1852, Yule was sent to Arakan, to survey the frontier between that province and Upper Burma. Here he came under the notice of Colonel (afterwards Sir Arthur) Phayre; and when that officer went to Ava in 1855, at the head of a mission from the Governor-General, Lord Dalhousie, Captain Henry Yule was selected to accompany him as secretary. He penned the narrative of this mission, published as an official report in Calcutta in 1855, and two years later in a more popular form, illustrated by his own sketches. In this, his first important literary effort, he foreshadowed the bent of his literary genius, to be developed more fully in his later works. The same depth of research and grouping of facts, the same wealth of annotation and remarkable accuracy, the same attention to details and orderly exposition, are here to be noticed.

Yule had already written a text-book on *Fortification* for the use of pupils in the Military Academy, Edinburgh, and several papers on scientific and geographical subjects for the Journal of the Asiatic Society of Bengal. In one of the earliest of these he drew attention to the extraordinary rainfall at Chirapunji in the Kasia hills, 300 miles north-east of Calcutta. In another he referred to a Canal Act of the Emperor Akbar, and in a third to the controversy which even then was raging round the Tsanpo, Brahmaputra, and Irawadi. This *vexata quæstio* had almost attained the importance of a national dispute—Englishmen for the Brahmaputra, Frenchmen for the Irawadi; and even at the present day, while every additional evidence that has been produced tends to show the English view to be the right one, there are still doubts, only to be set at rest by further exploration.

During the Indian Mutiny Yule's special duty was to keep open railway communication in the valley of the Ganges. From 1858 to 1862 he was Secretary to Government in the Public Works Depart-

[1] Colonel Yule acquired and kept in repair as a burial-place the old ruined church of Gullane in that county, which is full of tombstones or monuments to various members of his family.

ment, and while holding that responsible post he enjoyed the confidence and friendship of Lord Canning, as he had previously of Lord Dalhousie. Their appreciation of his services marked him out for a distinguished career. But circumstances now arose which, combined with general weariness of India and hope of employment at home through Lord Canning's influence, caused Yule to send in his resignation. They came home together, but Lord Canning's death a few weeks later closed Yule's prospects for the time; and it was only with difficulty, and by the private influence, then very considerable, of Sir Roderick Murchison, that the Companionship of the Bath, long promised him, was in 1863 conferred. It was at the close of 1864 that his wife's failing health took Yule to Sicily. Some years before this he had begun to annotate the works of certain early Italian travellers to India and China. In 1863 he edited for the Hakluyt Society the *Marvels* described by Friar Jordanus, and in 1866 a much more important work, in two volumes, entitled, *Cathay and the Way Thither*, a collection of mediæval notices on the geography of Asia with a preliminary essay on the intercourse between China and the Western nations previous to the discovery of the Cape route. It would be impossible to point out in this biographical sketch the value and importance of this work. It opened a new field of inquiry to the geographical student, and awakened a new interest in regions which had been a sealed book for centuries. But excellent as was Colonel Yule's *Cathay*, it was to be surpassed by his edition of *The Book of Ser Marco Polo*. In the preparation of this he had concentrated all his energies, and collected materials from all the public libraries of Europe. By visits to London and Paris and more especially to Venice and Florence, he was enabled to complete the materials of which the Palermo collections supplied the nucleus. The publication of *Marco Polo* in 1870 at once raised Yule to the first place among geographers of the day. His work brought him many friends, for all interested in the same branch of literature recognised in him a master, and hastened to consult him with reference to their own labours. Among those he especially valued were Cristoforo Negri, founder and first President of the Geographical Society of Italy, and his disciple Guglielmo Berchet. To the generous efforts of Negri, Italy mainly owes the revival of geographical study and enterprise: Berchet's services are familiar to all students of Venetian History. From Negri Colonel Yule's work received its first public recognition in the shape of the very beautiful gold medal of the Society, and from Berchet he received during twenty-one years more gifts of learned help and generous friendship than it is possible to record. Nor should mention be omitted of Baron von Richthofen, whose great work on China elicited Yule's warmest admiration, and for whom he had great regard.

In England the publication of *Marco Polo* obtained for Yule the Founder's Medal of the Royal Geographical Society, and, what was even more valuable, the recognition of its merits by the most distinguished travellers and geographers of the day. Mr. Ney Elias, in crossing from China through Western Mongolia to Russia, carried with him a copy of this work, and it served as a guide and handbook to the members of the late Sir Douglas Forsyth's expedition while exploring Eastern Turkestan and

the Pamir Highlands. The late Robert Shaw, Colborne Baber, and many other travellers, have also derived benefit from consulting the pages on which the great Venetian's travels are recorded, and in following his footsteps in Asia have been helped on their way by the landmarks Colonel Yule's learning has put up for them.

In connection with his services to Central Asian geography allusion should be made to his papers on the Upper Oxus Regions (*Journal R.G.S.* 1872). In these he shows the origin of some of Klaproth's mistaken geography by the discovery that a certain square of a Chinese map constructed in 1759, had been accidentally turned round through an angle of 90°, so that the district of Wakhan, for instance, instead of being in the same parallel as Badakhshan, was placed in the map 100 miles to the northward.

Among Yule's minor works about this time were his introductory remarks to the English translation of Prejevalsky's *Mongolia*, his introductory essay to Wood's *Journey to the Source of the River Oxus*, and his prefatory notice to the late Captain Gill's *River of Golden Sand*. He also contributed a number of articles to the ninth edition of the *Encyclopædia Britannica*. In 1875, after having lived in comparative retirement for upwards of twelve years, Colonel Yule accepted the offer of a seat for life on the Council of India. The value of his services during his fourteen years' stay in the India Office was recognised by his official superiors, and upon his retirement a few months ago a well-deserved compliment was paid by Lord Cross to the excellence of his work. In the midst of the pressure of official duties Colonel Yule still found time for his favourite literary pursuits. As President of the Hakluyt Society from 1877 to the year of his death he gave invaluable assistance in the preparation of their publications. Linschoten's voyage and Sir W. Hedges' diary bear the impress of his scholarly mind, while in two supplementary volumes to the last-named work he collected a number of illustrative notices on the early history of the East India Company, giving a fresh interest to the somewhat dry record of a merchant's diary in the seventeenth century.

Yule also undertook, in conjunction with the late Arthur Burnell, an Anglo-Indian glossary entitled *Hobson-Jobson*, but owing to the premature death of his *collaborateur* almost the whole of this work fell upon him.

He was President of the Geographical Section of the British Association at Edinburgh in 1871; from 1885 to 1887 he was President of the Royal Asiatic Society, and a Vice of the Royal Geographical Society from 1887 to 1889.

His talents were not confined to literary and official lines only: he designed the monument at Cawnpore, erected in memory of the English who perished there during the Mutiny, and composed the epitaph for that as well as for the tablet put up in the crypt of St. Paul's to the memory of Palmer, Gill, and Charrington, who perished at the hands of the Arabs while on a mission for the British Government.

It is impossible to do justice to his kindness of disposition. We have spoken of the ready help he lent to all fellow-workers in the same field. Though an unsparing critic, he never dipped his pen in gall or intentionally wounded any one, but when he espoused a cause

he considered right he threw himself into it heart and soul regardless of consequences.

Surrounded by portraits of old friends and associates and by his books, Colonel Yule welcomed his friends to the last, and only eight hours before his death he returned the following answer to a communication from the French Academy making him a Corresponding Member :— "Reddo gratias, illustrissimi domini, ob honores tanto nimios quanto immeritos. Mihi robora deficiunt, vita collabitur, accipiatis voluntatem pro facto. Cum corde pleno et gratissimo moriturus vos, illustrissimi domini, saluto.—Yule."

E. DELMAR MORGAN.

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(*All the above notices but one were originally printed in the "Royal Engineers Journal," and afterwards reprinted separately.*)

# GEOGRAPHICAL NOTES.

## AFRICA.

**The Portuguese and Ancient Buildings in Africa.**—In the fourth volume of the *Atlas Geographicus*, published at the beginning of last century, and based on the publications of Dapper, Cluverius, Texiera, Vincent Blanc, Du Plessis, Morery, Heylin, Luyts, Varenius, Cellarius, the Sansons, etc., we have a pretty full and accurate account of what was then really known to the Portuguese in common with other Europeans. The following extracts of a few passages (given *literatim*) may not be without interest just at present :—

"Inhaban or Inhamban : the capital town is Tongue or Tongum, the Seat-royal of its Kings, and memorable for the baptism of the whole Royal Family in 1560 by Gonsalvo Silviera" (p. 607). Dapper adds . . . "the Portuguese Jesuits have converted a great number of these Negroes to Christianity, and the Emperor himself, with his Mother, and above 300 Gentlemen, were baptized in 1560 by Gonsalvo Sylviera. He was christened Sebastian, the Name of the then King of Portugal ; but being persuaded by four Turks that the Jesuit was a Magician, he caused his Head to be cut off. However, he lived to repent it, and punished the Musselmen in the same manner." Heylin adds, that "after the King had caused the above-named Jesuit to be slain, the King of Portugal sent 1600 men against him, under Francisco Barretis, to whom he offered an *Amende honorable* ; but he being greedy of Revenge, preferred a Battle, in which he was overcome, his Forces soon after consumed by Sickness, and the Hopes of Christianity in this Kingdom fell, together with the Portuguese interest" (pp. 605-6).

The king of Inhamban, Heylin says, "is Vassal and tributary to the Emperor of Monomotapa." And the city of Monomotapa, the geographers agreed, was on the river St. Esprit or Delagoa—apparently the Limpopo, but Moll differed from the Sansons as to its longitude by fully 13 degrees. The Portuguese must therefore have only heard of it from native reports. The geographer says—"Some call it Banamatapa, and others Madragan. Dapper says, 'tis a great Town, six days' Journey from a Palace called Simbae, and 20 miles [?] W. from Sofala. The imperial Palace here is very large, with four great Porticos, where the Emperor's Guards keep Centry in their turns. The out-parts are fortified with Towers, and the inside is divided into several spacious Rooms, garnished with cotton Hangings of lively Colours and trimmed with Gold. Some say the Ceiling, Beams, and Rafters are gilt or covered with Plates of Gold ; that the Apartments are set out with Chairs, gilt, painted, and enamelled, and Candlesticks of Ivory hung on Chains of Silver. His Plates are of Porcelain, adorned with Branches of Gold like those of Coral. The Sansons say, he has other Palaces called Symbave, in several Parts of his Dominions, especially one towards Buttua, remarkable for the vast Size of the Stones in its walls, and for several ancient and unknown Inscriptions over the Gate." Again, Dapper says of Butua or Toraca or Toroa, "that in the Middle of this Province, among the Iron Mines, there 's a large square Castle of polished square Freestones of a prodigious Size, placed one upon another without Lime or Mortar. The Walls are 25 spans thick, but not proportionable in Height. There 's an Inscription upon it in unknown Characters. The Natives say it was built by the Devil, because there 's no stone Structure nearer it than the Portuguese Fort upon the Coast, which is above 200 Leagues from it. 'Tis much stronger than theirs, and here the Emperor keeps some of his Wives and a good Garrison" (p. 606). Heylin

says that "the Castle above-mentioned was built to secure the Mines [of gold]. Those who take Sofala for the Land of Ophir, think 'twas built by Solomon ; but Heylin makes it 510 miles more to the west" [*i.e.* of Sofala], p. 607.

Various claimants were thus put forth in the seventeenth century as the probable builders of these forts or stone palaces, but no one then attributed them to the Portuguese, nor did they venture to dispute the claims of more ancient majesties. The reports, though very exaggerated, are curious and based on the existence of stone buildings in the interior. Cluverius, speaking of the capital Monomotopa, says—"Hinc versus septentrionem mill. circiter L. distat nobile ædificium amplum atque antiquum, quadratâ formâ ex ingentibus saxis constructum ;" and Jo. Buno states that it is in the province of Butua and called Zimbaos. It was regarded as *ancient* in the seventeenth century, and must therefore have long antedated the Portuguese settlement at Mozambique ; and there were more than one Symbave. If the "Inscription" could be recovered, it would set their origin at rest, and almost certainly open up a strange chapter in history.

Here is an extract from Jo. Buno, quoted in a note in the edition of Cluverius by A. Bruzen de la Martinière, geographer to Philip v. of Spain. Speaking of the storms occurring at the Cape of Good Hope, he adds : "Lusitanis verò frequentiora his in locis contingunt naufragia. Unde anno 1589, Lusitanus quidam navarchus, cum ad terram de Natal et promontorium Bonæ Spei tempestatibus jactaretur, mirari se dixit, cur Deus Lusitanos, qui tamen essent Catholici et boni Christiani, semper ita torqueat ad Caput Bonæ Spei ; quum tamen Angli, hæretici et impii homines, id facile superent," *i.e.* To the Portuguese indeed shipwrecks more frequently occur hereabouts ; so that in 1589, when a certain Portuguese admiral, coming from Natal, was cast by tempests on the Cape—he said he was astonished that God should so distress the Portuguese at the Cape of Good Hope, who were Catholics and good Christians, when the English—heretics and wicked—passed it with ease.

**The Congo State and the Arabs.**—The *Deutsche Kolonialzeitung*, Sept. 14th, 1889, contains an article on this subject. The writer fears that the Arabs may before long advance further to the west and prove dangerous to the Congo State. The French traveller, Trivier, stated that he found the country in their hands as far downstream as the mouth of the Aruwimi. Stanley also, in 1887, came upon the Arab outposts on the left bank of the middle course of the Aruwimi, and now they are to be found further down on the right bank. Trivier expects that within two years they will have advanced to Bangala, and that they will establish themselves in fair security along the upper Congo, now occupied by savage and dangerous tribes, by forming a solitude around. Great difference of opinion prevails regarding the loyalty of Tippu Tib. Trivier abstains from saying anything about him in return for the kindness he received at his hands. On the other hand, Capt. Becker, an officer of the State, and Lieut. Dhanis, formerly in its service, defend Tippu Tib and his brethren. Lieut. Tobbaek believes that the Arabs' love of luxuries gives ground for hoping that they may be taught to carry on a legitimate trade. The attack of Rajid, Tippu Tib's nephew, on the Falls Station in 1886, and Tippu Tib's bargain with the Dutch for a quantity of breechloaders, which, fortunately, were seized by the Government, are circumstances which cannot fail to excite suspicion. The writer in the *Kolonialzeitung* believes that the rifles were to be sent to arm the natives on the East Coast, and, indeed, that Tippu Tib is a prime mover in the disturbance there. He further believes that Tippu Tib fully appreciates the superiority of the Congo, as a means of access to the interior of Africa, over the long land route from the East Coast, and that he is making

preparations to acquire control over this route while waiting for a favourable opportunity of striking the first blow.

**The Suppression of Slavery and the Protection of the Natives in the Congo Independent State.**—A report on this function of the Government forms the *Bulletin Officiel de l'Etat Indépendant du Congo* for November 1889. The legislative decrees now in force affecting this question are, firstly, the Act of the Conference of Berlin (Art. 6 and 9), which is embodied in the State code, and which forbids all interference with the liberty of the subject under any form or pretext. Next, there is the penal code (the 6th and following articles), by which all forms of slavery, even domestic, are forbidden, and penalties are denounced against those who, directly or indirectly, by open violence or by secret devices, deprive a man of his liberty, or engage in the traffic or transport of slaves. Lastly, in November 1888 a decree was promulgated which has for its aim the protection of the natives in general, and provides in particular for a strict surveillance of contracts, lest engagements intended by the natives to be temporary should degenerate into domestic slavery. In the execution of these laws the Natives are looked upon as minors, incapable of acting for themselves, and the Directeur de la Justice is empowered and enjoined to take the initiative where he discovers any breach of these laws. Contracts for labour are not valid for longer than seven years, even with the consent of both contracting parties : they must be made in writing, and the document must be submitted to the authorities, that it may be ascertained that the native enters into the engagement of his own free will, and that the conditions of service, such as length of engagement, wages, services required, etc., may be known and inscribed in the registers provided for the purpose. In those cases where the natives engaged are taken to a distance, the law requires proof of their willingness to leave their homes, and the documents must be drawn up under the supervision of the authorities of their native place. The master or employer is responsible for the execution of the deed, and therefore he can obtain no redress, if a dispute arises, unless he can produce a contract indorsed by the authorities. On the other hand, a native can take his stand upon a contract if he can establish its existence by proof of any kind. He can also appeal to local customs, as far as they are in his favour, but he is not at liberty to repudiate his engagements arbitrarily. He, too, must conform to local customs in the absence of contracts, as far as they are in harmony with the law and not subversive of public order. For instance, a native may, in the absence of a contract, terminate his engagement, but not without giving his employer the length of notice exacted by local usage. A contract may be renewed at the expiration of the term for which it has been made, but it must be done with the knowledge and consent of the authorities, otherwise the seven years' limitation might be eluded by renewal of contracts. With respect to wages, a master may not pay them in kind except with the consent of his servant, and, if not authorised to do so by the contract, must furnish proof of a later agreement; and the same rule applies to the expenses of sending the native back to his village. In these cases no appeal is allowed to local customs.

The Government has enjoined the Commissioner of Justice to watch attentively the working of these Acts. He reports that no circumstances directly or indirectly connected with the traffic in slaves or their transport have come under his cognisance, nor does he believe that a modified form of slavery exists under pretext of obligations freely contracted. The Natives are more capable of guarding their interests by legal forms than might be expected of an uncivilised people. They are careful to demand a *mukand* or memorandum setting forth the terms of the contract, and to preserve it carefully in case of necessity. If he believes he

has suffered injury through a breach of the contract, he has recourse immediately to the judge, and displays considerable talents as a pleader, and maintains his claims with great tenacity. His freedom is in no danger from long or renewed contracts, for he seldom engages himself for more than six months or a year, and then returns to his village to spend the little hoard he has accumulated.

Of course these regulations can be enforced only within the limits to which the authority of the Congo State extends. But these limits are extending fast. Slavery has been almost entirely crushed in the immediate neighbourhood of the Congo. The station at Stanley Falls is a great protection against the incursions of Arab slave-traders from the east, and further security will be obtained by the establishment of a station, already commenced, in the district of the upper Lomami. The standing army has been increased to nearly 2200 men, and has been subjected to a more thorough training than in former years. The formation of a native militia is progressing; it numbers already some 5000 men in the Bangala country, and 3000 in the neighbourhood of the Aruwimi and Stanley Falls. The supply of arms has been increased and improved; three small steamers and three sailing vessels have been added to the flotilla of the upper Congo, which will be further enlarged by the addition of two new steamers.

The *modus vivendi* concluded with Tippu Tib was the result of a desire to avoid a deadly contest with men not entirely devoid of good qualities. Though it has not achieved all the advantages it promised, it has in a measure contributed to mitigate the horrors of slave-hunting, and facilitated the restoration and extension of the influence of the State at Stanley Falls without shedding of blood. It is to be hoped that the energy of the Arab half-castes may be turned to other commercial operations, and that the railway will promote this revolution.

## AMERICA.

**The Urban Population of the United States.**—In no other country of the world do towns increase so rapidly as in the United States, nor is this fact surprising, considering the large and constant influx of immigrants. In the year 1880 there were in the United States ten towns of over 200,000 inhabitants, twenty with a population of over 100,000, thirty-five with over 50,000, and one hundred with over 20,000. The increase of the population of the principal towns between 1870 and 1880 was as follows:—New York, from 942,292 to 1,206,299; Philadelphia, from 674,022 to 847,170; Brooklyn, 396,090 to 569,663; Chicago, from 298,177 to 503,185; Boston, from 250,526 to 362,839; St. Louis, from 310,864 to 350,518; Baltimore, from 267,354 to 332,113; Cincinnati, from 216,329 to 255,139; San Francisco, from 149,473 to 233,959; and New Orleans, from 191,418 to 216,090. From the table given in the *Deutsche Rundschau*, Bd. xii. Heft 3, it may be calculated that the inhabitants not born in the town amount in New York to 39½ per cent. of the total, in Chicago to 47, San Francisco to 44½, Milwaukee to 40, and in Detroit to 39 per cent. In all the southern and eastern towns, and in some of the western—Salt Lake City of course—the females are more numerous than the males; but in Chicago, San Louis, Kansas City, Denver, and one or two others, the case is reversed. In the last-mentioned town, the men are to the women about in the proportion 3 : 2. The total population of the towns of the United States having more than 20,000 inhabitants is 8,010,614, or nearly 16 per cent. of the population of the country.

**Western Mexico.**—In the current *Bulletin* of the Hungarian Geographical Society, M. Xántus, who has spent two years on the Western Coast of Mexico, including the states of Jalisco, Colima, Michoacan, and Guerrero, describes the

geographical features, etc., of those districts. He describes his journey from the port of Manzanillo to Colima. From Manzanillo to the so-called Salinas, the bridle-path leads between the sea and the great Laguna of Cuyutlan, through a sandy waste. The Salinas, ten leagues distant from the port, are situated at the end of the lake, where, during the dry season, the shallow water evaporates, and the ground is found to be impregnated with saline deposits, and is covered with a whitish incrustation. At that season a population of five or six thousand men, women, and children are there engaged in the manufacture of salt. From the Salinas to the Armeria river the country is covered with forest and jungle, in which are to be found here and there small settlements of Indians, who cultivate the rich soil. From the river Armeria the trail ascends rapidly towards the dividing ridge between Colima and the sea-coast, winding through almost impenetrable forest; it then descends into a deep gully to Rancho de Rosario, and thence passes by some fine maguey plantations to the beautiful Indian village of Cochimatlan. From the last-named spot, most of the country traversed by M. Xántus was a fertile plain with a few low hills. Few species of plants were to be seen, except cactuses and maguey or *Agave Americana*, from the fibre of which paper, thread, cloth, rope, cordage, and bagging are manufactured. The valley of Colima is one of the most fertile in the country, and is irrigated by the river of the same name. Twenty-five miles to the north-east of the town stands the volcano Colima, which is of such a height that it serves as a landmark for sailors entering the port of Manzanillo. On its slopes, which are of course very fertile, are some settlements of Indians, who cultivate maize, rice, and bananas, and keep cattle. The city of Colima, founded by Cortes, 1522-24, is 80 miles from Manzanillo. It is the capital of the state of the same name, and a depôt from which imports are distributed through the interior. The population is probably nearly 30,000. Hats, shoes, boots, clothing, and earthenware are manufactured here for home use. There are two cotton factories, the larger of which yields a profit of £4000 annually, or 20 per cent. In the surrounding country are plantations of sugar-cane, coffee, coco, cotton, indigo, and rice; but, owing to the laziness of the natives, the produce barely suffices for the home consumption, and leaves no surplus for exportation. From Colima M. Xántus proceeded to Guadalajara, passing through Zapotlan and Sayula. At the last-mentioned town there is a paper factory which pays 20 per cent., and also a flour mill, where very indifferent flour is produced. From Zapotlan to Guadalajara, a distance of 120 miles, a stage-coach runs daily. The population is largely composed of Indians of pure and mixed race. The proportion of coloured inhabitants in some of the towns is as large as nineteen-twentieths. The Indians are lazy, deceitful, and dirty. The proprietors of haciendas succeed in persuading them to do enough work to obtain a bare subsistence; but they would not submit even to this small amount of toil were there sufficient opportunities for stealing. Their favourite pursuits are cock-fighting, bull-fighting, riding, and dancing. While the difficulty of obtaining labour lessens the quantity of produce which might be yielded by the country, the absence of modern agricultural improvements affects their quality also; the sugar, for instance, grown in Western Mexico bearing no comparison with that of Louisiana or Cuba.

**The Rocks and Minerals of British Guiana.**—*Timehri*, the journal of the Royal Agricultural and Commercial Society of British Guiana, June 1889, gives a list of rocks in the British Guiana Museum. The present list is only a first instalment: further lists will be published as the minerals are identified and classified. The rocks are arranged in four chief groups—(1) alluvial deposits; (2) the sandstone formation; (3) metamorphic rocks; (4) granitic rocks. Of the first group the

coast deposit is the most important; it extends inland to a distance varying from 5 to 25 miles, with a depth of 100 feet, and consists of layers of blue clay and sand and a small admixture of decayed vegetable matter. Some of the clay is suitable of brick-making. Below this, and extending inland beyond it, lies a sand and clay deposit, forming a tract varying in height from 60 to 150 feet. The white sand of this deposit is generally pure, and well adapted for glass-making, while the white clay, especially that which is found at Oreala on the Corentyne River, would probably make good porcelain. The sandstone formation constitutes a large part of the Pacaraima Mountains, and crosses all the chief river-systems of the colony. It consists of beds of coarse conglomerate, red and white sandstone, and red shale, in which greenstone is imbedded, partly contemporaneous, partly intrusive. Red jasper suitable for inlaid work is found in some parts of this formation. As no fossils have hitherto been found in this sandstone, it cannot be classified with absolute certainty, but there is little doubt that it is an equivalent of the New Red Sandstone. The most distinctive natural features of the country are connected with this formation. The greenstone consists chiefly of a coarse variety of diorite. It occurs in continuous layers, as isolated hills formed by denudation, and as eruptive dykes. Igneous action must have been very active and widespread at the time of its formation, and to this cause may be ascribed, perhaps, the absence of fossils in the sedimentary deposits. Masses of iron ore and small quantities of manganese are found associated with the greenstone rocks. The metamorphic rocks include the various schists, and also gneiss. The gneiss rests chiefly on granite, and is often granitoid, occasionally even porphyritic. Garnets and quartz nests are widely distributed through this rock, and an impure graphite occurs in the schistose strata on the Carabung and Barima rivers. Systematic search is bringing to light the fact that gold is both widely and plentifully distributed in this system. The granitic rocks are quartz-porphyry, felsite, granite proper, and syenite. Their texture and colour are very variable. Granite is a very common surface-rock throughout the interior of the colony, and many of the members of this group are adapted for ornamental purposes. Gold promises to become an important article of export, and diamonds have been found, but too small to have any value.

**The Essequibo and Potaro Rivers.**—In March 1889 the editor of *Timehri* (Agric. and Com. Soc. of Brit. Guiana) made an expedition up these rivers in order to collect specimens for the Guiana Museum. At Bartica Grove he engaged a boat and a crew of twelve men. About 20 miles above Bartica Grove and 5 above Morabally Creek the granitic bars first appear, which render the river unnavigable by causing rapids. These rapids extend for 15 miles up the river, after which smooth water is met with nearly to the mouth of the Potaro, 60 miles distant. The numerous islands of all sizes and shapes, rounded blocks of granite covered with a black or dark-coppery layer, and masses of yellow sand, render the scenery at the rapids particularly attractive; nor is it uninteresting further up the river. A paucity of flowering plants was noticeable, but their absence was partly compensated for by the varied foliage of the forest trees. The hill of Arrisaro would form an excellent health resort; and, if a canal be cut past the rapids—a work which will probably be undertaken—the hill will be within easy reach of Georgetown. Twenty miles up the Potaro a dyke of greensand forms a cataract 20 feet in height, and farther up the river rushes through a series of rapids, falls, and cataracts. Still farther up, where only light boats can ascend, the Potaro falls over the edge of an amphitheatre 800 feet in height. This is the well-known Kaieteur Fall. The scenery around this fall, and indeed all along the banks of the Potaro, is strikingly

picturesque. Mr. Quelch gives a great deal of information about the land and water animals, insects, and birds which he observed or collected, in his article inserted in *Timehri*, June 1889.

**Population of Chile.**—Professor R. A. Philippi has sent to *Globus*, Bd. 56, No. xiii., a table showing the population of the provinces of Chile and their chief towns. The last census was taken in 1885, and the present state of the population is estimated by the statistical department from the registers of birth and deaths. The most populous provinces are : Santiago, 358,449 ; Valparaiso, 212,810 ; Concepcion, 204,645 ; the least populous is the Magallanes territory, 2,641. The largest towns are Santiago, 189,333, and Valparaiso, 104,952. The next town, Concepcion, falls far short of these, having only 24,180 inhabitants. There are in all twenty-four provinces. The total number of inhabitants found by actual enumeration is 2,665,926, but to this sum must be added the number of those omitted at the last census, estimated at 15 per cent., and the natives, who are supposed to number about 50,000, so that the whole population amounts roughly to 3,115,815. According to the census of 1885, the number of foreigners was 87,077, including 34,901 Peruvians and 13,146 Bolivians in the recently annexed provinces of Antofagasta, Tarapacá, and Tacna. Of these 6808 were Germans, 4198 Frenchmen, 4114 Italians, and 2508 Spaniards. At the same census there were 484 persons whose ages were given as over 100, and one man who had reached 150 years —doubtless the oldest man in the world, if his age has been given correctly.

## COMMERCIAL GEOGRAPHY.

**The Trade of Bokhara.**—According to Dr. O. Heyfelder (*Petermann's Mitteilungen*, Bd. 35, No. xi.), the trade of Bokhara is now almost exclusively in the hands of the Russians. The trade with Russia has increased enormously during the last twenty years. The old caravan route to Russia passes through Kasalinsk and Orenburg to the Volga, whence the goods are transported to Nijni Novgorod and Moscow, and still holds its ground in defiance of the new railway. The freightage has fallen considerably, and the traffic is admirably managed, so that the desert route is often preferred when time is no object. The principal channel for merchandise, however, is by the railway to the Caspian, then by the Baku-Batum route to the Black Sea, and by train to Russia, or by sea to the Baltic. Sometimes, also, goods are carried by boat to Astrakhan and up the Volga to Tsaratzin, Nijni Novgorod, or other railway termini. The trade between Bokhara and India, Afghanistan, China and Persia, has almost disappeared. British wares, except fine white muslin for turbans and certain coloured muslins for women's dresses, have been driven out of the market by Russian substitutes. Indeed, since Kars was conquered and Batum occupied in 1878, and especially since (1885) Batum has ceased to be a free port, Transcaspia has been incorporated in the Russian Empire, and the railway opened, British goods have gradually been driven out of the whole tract from the Caucasus to the Pamir Plateau. The route from India to Bokhara formerly passed through Peshawur, Cabul, and Kilef, but the disturbances in Afghanistan obliged caravans to take another route through Bender, Abassia, Herat, and Kerki, joining the road from Persia, but the old route was reopened in 1889. All the attempts of foreign firms to establish direct communications with Bokhara have proved fruitless, and no good result is to be expected from the agitation for consulates set on foot by French trading companies and geographical societies. The exports of Bokhara are principally raw materials—cotton, wool, hides, and furs. Iron, sugar, silk, tea, indigo, materials, and bar-silver are imported.

**The Argentine Republic—Pastoral Occupations.**—M. Washington Serruys gives a short account of the sheep, cattle, and horse feeding in this State in the *Bull. de la Soc. R. de Géographie d'Anvers*, tom. xiii. 4me Fasc. The number of cattle is given from official sources as 14,206,499; of sheep, 72,683,015; and of horses, 4,856,808. The numbers of horses, cattle, and sheep respectively per 1000 of inhabitants are 1868, 5464, and 27,955. For Great Britain the corresponding numbers are 86, 292, and 946. Sheep-feeding, though extremely profitable, is disdained by the old *estancero*, and is chiefly carried on by newly-arrived immigrants, for it requires little capital and not much special knowledge. Land of good quality covered with tender grass may be bought at from 6s. 6d. to £6, 10s. per acre, according to its distance from a town; 370 acres is a liberal allowance for a flock of 1000 sheep. At 6s. 6d. the land will cost about £120, and the sheep at the average price of 4s. per head will cost £200. Adding £40 for small expenses, we find that the total outlay amounts to £360. The wool is worth 12s. to 18s. the *arroba* (about 25½ lbs.), and the value of the skins goes up to 64s. the dozen. The lambs in a flock of 1000 should not be fewer than 450, so that about 400 fat sheep may be sold at the end of the year; they fetch about 7s. each. It is thus evident that, if no accidents happen, the profit will be nearly 100 per cent. The sheep-runs are as a rule small, though some have an area of 15, 20, or even 40 square miles. They are usually managed on the métayer system. Sheep-grazing was introduced in 1852. Since then the breed has been considerably improved, and the trade in wool and skins has consequently increased. In 1873, according to the Comte d'Ursel, the value of the sheepskins, wool, and tallow exported amounted to six millions sterling. To commence cattle-grazing a capital of not less than £8000 is necessary. The ranche should not be less than 8 square miles; there are some over 200 square miles. The cost of the 8 square miles of land adapted for cattle is £2000 to £4000, and it will support 3000 head. The animals cost 36s. per head on an average, and therefore the cost of the herd will be £5000 to £6000. Such a herd should produce 800 calves in the year, so that the stock will be doubled in less than four years, and, when these young animals begin to breed, the herd will be tripled in the same space of time. Of course, loss from disease and other causes must be expected. The animals are the cattle which roamed wild over the prairies only fifty years ago, and are descended from a small herd brought over by the Spaniards in 1553. A large proportion of them are killed for the sake of the hide, tallow, and bone only. Near the large towns there are some dairy farms, and of late years British and Dutch cows have been imported to improve the breed. The horses still preserve traces of their Andalusian origin; they are small, broad-chested, and rather short in the back. They are, as a rule, badly trained, are vicious, and have a bad action. The price of a horse is 36s. in the province of Tucuman, 12s. in Santa Fé, and half a guinea in Entre Rios and Buenos Ayres. A well-trained horse fetches £3 or £4. Until the breed is improved by crossing with horses of a heavier and more powerful build, they cannot be exported successfully.

## NEW BOOKS.

*A Thousand Miles on an Elephant in the Shan States.* By HOLT S. HALLETT, M. Inst. C.E., etc. Edinburgh and London: William Blackwood and Sons. Pp. xxxvi and 484. *Price* 21*s.*

Mr. Holt Hallett is well known to those interested in such matters by the perseverance with which he has advocated a particular scheme intended to facilitate, and thereby develop, the trade intercourse between the south-west provinces of China and our Burmese possessions. He has written various papers, and given various addresses, explaining his views on the subject, and these are set forth with considerable fulness in the work before us. The volume however has, besides, the more general interest attaching to a narrative of travel by a competent observer in unfamiliar regions; its value, as the author cordially acknowledges, being much enhanced by the fact that he was accompanied on the greater part of his journey by experienced members of the American Mission, which has laboured with so much success among the Karen and other tribes inhabiting the Burmo-Siamese frontier. Besides the ordinary needs for interpretation, the assistance, in investigating questions of philosophy or religion or customs, of such men as Dr. Cushing, the author of the *Shan Dictionary*, of Dr. M'Gilvary, and others, was, even to a traveller acquainted with Burmese, quite invaluable; and Mr. Hallett has used his rare opportunities to good purpose. There is, however, in the composition of the volume one point—though one of form only—to which the reader may justly take exception. The author has attempted what seems to us the impossible task of interweaving with the general narrative and observations on scenery, people, customs, and the like, the details of distances, heights, bearings, and other facts explanatory of his survey;—an arrangement which will inevitably entail much skipping both on the "general reader" and on the specialist who desires chiefly to master the topographical details. The maps, if not arranged very conveniently for the former class of reader, are of great interest, dealing separately with the different sections of the proposed railway lines; it is to be regretted only that the general map is not on a larger scale. The book, as we have implied, abounds in matter of general interest. It describes a country which, notwithstanding the prevalence of malarial fever and of smallpox, is replete with attractions. The proportion of fine scenery seems considerable; abundant rivers, some of great size, occasionally cutting their way through precipitous defiles, but more generally winding through wide fertile plains or straths bounded by ranges clothed with many kinds of valuable timbers,—of which, however, the author usually gives only the native names, which are not of much use to us here. Some of the cities are of considerable size, and many more lie in ruins, whose vast extent, and the great masses of ruined temples and prostrate statues, speak of long ages of civilisation. The great homogeneity of the different branches of the Shan race, while living remote from each other and under different political systems, is remarkable. And their history is not undistinguished: when at the height of its power, towards the thirteenth century, the influence of the Shan empire embraced Arakan on the west and Tali on the north, and was felt throughout the Indo-Chinese peninsula, and, it is said, even in Java. The manners of the people to-day are in accordance with this civilised past. It is very remarkable that on a journey of many months in these remote regions the author was not only never in the smallest personal danger, but only once met with rudeness sufficient to call for complaint; and as a rule he met with nothing but courtesy and friendliness from chiefs and people. Buddhism, in these Shan States, exists usually only as a veneer covering the older spirit and nature worship, which in a lesser degree under-

lies also the religion of Siam. Mr. Hallett gives a full and often amusing description of the grotesque superstitions which, he declares, control and hamper all the commonest actions of life; we may doubt, however, whether existence is in consequence quite such a burthen as he would imply, or as it logically ought to be. Whatever the shortcomings of the Government—and Mr. Hallett speaks freely of these, being particularly severe on the government of Siam proper (and indeed on the Siamese generally)—the security he notices for life and property speaks much in their favour; for the Shans, though a cognate people, are by no means so effeminate or dependent as the Siamese, and yet the trading caravans which the author met passing through from China into Burma were practically unarmed. There can at all events be no pressure on the means of subsistence, for the population is very sparse,—the result of the enormous slaughter which has always characterised the wars waged between the Shans, Burmese, and Siamese. Mr. Hallett tells us something of the forced transplantation of population from one part of the country to the other, quoting on this subject an interesting report by Mr. Consul Archer, which we noticed at length in this Magazine (vol. v. p. 12). Certain privileges appear on such occasions to be granted to the slaves—slavery for debt being very rife among all these Indo-Chinese peoples; but these forced moves are attended by much present suffering, and the population is nowhere dense enough to make them necessary, though there may be ultimate advantages.

We may now, without going into much detail, give shortly the outlines of the railway scheme proposed by the author. Observing the steady, but as it seems to us not very considerable, stream of trade which passes by way of the Shan States between the Chinese frontier town of Ssumao, in south-west Yunnan, and the Burmese port of Maulmein, he desires to connect these points by a railway; and it may be assumed that to the traffic already existing on this route would then be added much of that which now enters Burma from China by the difficult route to Bhamo. Mr. Hallett's survey deals with this proposed line, and with certain subsidiary branches, though his journey stopped short at Kiang-Tsen, which even as the crow flies is some 200 miles short of Ssumao. Let us admit, however, that the (short) portion of the line which passes through British territory could be made at the cost (£750,000) which he estimates, and that the Siamese construct their intended line from Bangkok up to Kiang Tsen, there still remains a considerable gap, say 120 miles at the very least, between the nearest available point on this line (which has been laid down under the able superintendence of Sir Andrew Clarke) and Mr. Hallett's proposed station at Myawadi on our frontier. And our difficulties are not ended here. In the first place, the rich districts of China, which it is wished to tap, lie at a considerable distance from the frontier, and might perhaps as easily be placed in communication with the Yang-tse-kiang; and even if the Chinese were disposed to make a railway to Ssumao (which, judging by their present action on the Yang-tse-kiang and by their general policy, seems unlikely), the physical difficulties of southern Yunnan are very great. Again, there is no guarantee that the trade of the Shan States and of Siam, which Mr. Hallett relies on obtaining, would come to Maulmein. It seems more likely that much of it would go to Bangkok. Then, again, the fact that so large a proportion of the proposed line lies outside our own territory will naturally indispose our Indian Government to give active support to it while so many of their own lines are unfinished. It would, Mr. Hallett says, open up our own (the late Burmese) Shan States; but it would only pass on their extreme eastern borders. While, therefore, we are far from expressing an opinion adverse to the value of his scheme, we feel that it is, at all events, incumbent on the author, before he appeals to the Indian Government for support, to prove that no alternative line lying wholly within our

own territories is available for a railway. We think he estimates justly the difficulties of a line from Bhamo into Yunnan, where the high passes and tremendous gorges, which apparently cannot be avoided, seem to render the cost prohibitive; and, as he points out, a line which appears very short on the map may actually, owing to the necessary detours, be longer than the more circuitous route which he proposes. But we venture to doubt whether we yet know enough of the valleys of the Shweli or of the Myit-ngi, or other possible routes further south across the country—difficult though it is known to be—eastward from the intended Rangoon-Mandalay line, to pronounce definitely that no such line is feasible.

We hope to return to this subject at another time; meanwhile we may commend Mr. Holt Hallett's book as containing much timely information about a region of which the importance to us, both politically and commercially, is rapidly increasing. C. T.

*Australia Twice Traversed: The Romance of Exploration. Being a Narrative compiled from the Journals of Five Exploring Expeditions into and through Central South Australia and Western Australia, from 1872 to 1876.* By Ernest Giles, Fellow and Gold Medallist of the Royal Geographical Society of London. In two volumes. With Maps and Illustrations. London: Sampson Low, Marston, Searle and Rivington, Limited, 1889. Pp. lix + 363. *Price* 30*s.*

Probably no part of the globe—in modern days at least—owes less to the great journeys and extended surveys of explorers than does Australia. Its rapid settlement on part of the coast resulted in the squatters pushing gradually more and more inland, and imperceptibly and seemingly without effort, opening up the country and rendering familiar its physical features and resources. Little or no record remains of the work thus quietly accomplished, and we must turn to the histories of the longer journeys and expeditions to gather ideas as to what the manner of life, the work, and the adventures and perils of the Australian explorer really are. On all these heads Mr. Giles's narrative supplies plentiful detail. One of the sub-titles of his book admirably describes the contents; it is truly a "romance of exploration." In his wanderings the hardships met with by the author were neither few nor small—want of water, superabundance of armed and hostile natives, bad ground, and the absence of pluck or skill on the part of some of his companions, all combined to hinder the progress of exploration and increase its dangers. Yet with all these disadvantages in his path, Mr. Giles has done thoroughly useful, satisfactory work, the story of which is well worth reading with attention.

It is impossible in our limited space to give even an outline of the routes followed by the author. Suffice it to say that in his various journeys he went as far north as the Tropic of Capricorn, and as far south as the shores of the Great Australian Bight, his furthest west point being Perth, in Western Australia. He discovered and named Lake Amadeus, as well as many mountains, some deserts, and not a few fertile and beautiful spots, fixing their positions, and very clearly describing the chief characteristics of each. But for particulars of routes, work, and adventure, the author's two handsome volumes must be referred to; and we venture to think that few will be disappointed with their contents. The narrative is written in a light, breezy style, and the interest never flags. If a fault is particularly looked for, it will probably be found in the author's love of too frequent quotation, generally poetic; but in view of the work performed and the quality of the story itself, a much greater blemish could easily be forgiven.

The volumes are printed in large, distinct type, accompanied by clear, well executed maps and graphic illustrations.

*How to Study Geography.* By Francis W. Parker. New York: D. Appleton and Company, 1889. (London agents: Wm. Allen and Co., Caxton House, Paternoster Square.) Pp. xxxv + 400. *Price* 6*s.*

In ancient days a form of torture consisted in sewing up the victim in the flexible warm skin of a newly killed ox, fitting this garment tightly but not to an uncomfortable degree. As the hide dried it contracted and hardened, inflicting untold misery on the poor wretch, misery which would not be mitigated if the onlookers gave him the clearest demonstration that it was unfair to his limbs not to allow them free scope, and absurd for him not to walk about like other people. Just so to teachers in this country who are bound by inflexible codes, the advice from across the Atlantic to enlarge the scope of their elementary teaching and adapt it to varying circumstances, however true it may be, is neither comforting nor very useful. Apart from this practical question as to how far it can be taken advantage of, there is much in Colonel Parker's work calling for comment. He invites "the sharp lance" of unfriendly criticism in the course of a brief preface, which also informs us that what he writes is the outcome of long experience. It is a systematic treatise comprising an introduction dealing with the motive, theory, method and difficulties of teaching geography, and a series of outline courses adapted for eight "grades" of study, leading up from the simplest concepts of form and colour to the occupations and governments of mankind. Political geography proper is relegated to a future volume of the International Education Series, where it will be considered along with history.

The style and language are somewhat pedantic and inflated; otherwise the theoretical part of the book resembles Dr. A. Geikie's *Teaching of Geography*, to which occasional reference is made. The Colonel is an enthusiastic teacher, and succeeds even in the bare outlines of a syllabus in inspiring his subject with a bright, breathing interest. His primary conception of the *slope* as a unit of elementary teaching is particularly striking, and in competent hands should prove very effective. In principle, he proceeds from the simple to the complex, hence we consider he makes a mistake in teaching the structure of North America, with its complicated western heights before that of the far simpler and perfectly typical South America. The advice to teachers to picture in their own minds, not maps, but the places they portray, and to make constant use of relief maps and "molding" in clay is excellent. The author inculcates cosmopolitan sympathies with all mankind; he would hail the "Australian bushman" as his brother. Yet the class prejudices and political antipathies of his nation crop out in considering the occupation of land by people who do not personally "plow" it. "The nomad and the aristocrat, the uncivilised and the ultra-civilised, which is the worse?" This conundrum is left unanswered. In giving the areas and populations of countries the British Empire is shorn of 1,500,000 square miles of territory, and about 150,000,000 of inhabitants. Moreover, "the English people who study only the countries they conquer," are implicitly stated to be very ignorant of geography. We hope they are extending their studies; for the author says they "claim the right to conquer all the weaker portions of the earth," and he even acknowledges indebtedness to a distinguished geologist whom we dimly recognise in "Geike, who is a great authority in the English-speaking world."

The notes on the geography of America are admirable, those on Eurasia are good, on Australia fair, but on Africa very poor. There are many slips in the anthropological section, and some of the explanations of names, conspicuously those of the Hoang-ho, Erzgebirge, and Ghauts, are at variance with recognised authorities.

*Introduction to the Study of Commercial Geography.* Part I. Map-Drawing and Projection from Memory, with a chapter on the Teaching of Commercial Geography by JOHN J. CARDWELL. Manchester: John Heywood. N.D. Pp. 58. *Price* 2*s.*

This little book has too narrow a name. It is not an introduction to Commercial Geography alone, but to Geography in the widest sense, just as the alphabet is not an introduction to school-books but to all literature. The importance of map-drawing is now thoroughly recognised in all the best schools, and the instructions and copious diagrams here given are as simple and clear a guide to drawing memory maps as can be desired. We commend them cordially.

The two chapters on the teaching of Commercial Geography occupy eight pages, and may be read in five minutes; they contain several repetitions and quotations, but still they show that Mr. Cardwell understands his subject both in itself and in its bearings on education generally. He quotes from the Society of Arts report for 1889, on the newly established examinations in commercial geography, that only eleven candidates appeared from all England and Wales, but omits to state that at the examination in the same subject conducted simultaneously and on similar lines by the Universities of Oxford and Cambridge, 66 candidates came forward. Of these 38 passed, and at the same examination last year 97 came forward and only 32 passed. We quite agree with Mr. Cardwell that while scientific geographers, political economists, and educationalists are impressed with the importance of teaching commercial geography, the parents of the wished-for learners do not yet see the use of it. To amplify Mr. Cardwell's statistics we may state that one candidate came forward in this subject at the Edinburgh University Local Examinations in 1889, and that there are at present only six students attending a course of sixty morning lectures on commercial geography at the Heriot-Watt College, so that Scotland fairly keeps ahead of England in neglecting this branch of education. Improvement must be a matter of time; and if teachers, as Mr. Cardwell truly says, are as yet incompetent to teach the subject, we believe that it is because there is no sufficient inducement to draw a better class of men to the work.

*A White Umbrella in Mexico.* By F. HOPKINSON SMITH. With Illustrations by the Author. London: Longmans, Green and Co., 1889. Pp. 227. *Price* 6*s.* 6*d.*

This dainty little volume is thoroughly American, both in the manner of its style and its general get-up. We follow the author with pleasure in his rambles among old-world scenes in Mexico, and are charmed at every step by his simple, good-natured criticisms. Mr. Hopkinson Smith is a true artist in spirit, but of a class that is rapidly dying out. His book, tastefully illustrated by himself, although scarcely geographical, reveals some side-lights in Mexican life that can not always be obtained, and certainly not so pleasantly, in more pretentious volumes. Next to travelling with him, we would like to travel in his track.

*Samoafahrten:* von Dr. O. FINSCH. *Ethnologischer Atlas, Typen aus der Steinzeit Neu-Guineas, in* 154 *Abbildungen auf* 24 *Tafeln, nach originalen gezeichnet:* von O. und E. FINSCH, mit erklärendem Text. Leipzig: F. Hirt u. Sohn. *Price* 16 *marks.*

These illustrations of Papuan art and industry will be highly acceptable to the student of ethnology, and they supplement usefully the author's previous notices of explorations in that region. Stone weapons, household furniture and other utensils, canoes, personal adornments, and sacred or quasi-sacred images are all represented, the forms and decorative designs being drawn with care and accuracy.

Translations of the explanatory letterpress are given in French and English. Not much can be said in praise of the translation—a criticism, however, which we should have withheld but that the translator appears to be an Englishman.

## NEW ATLAS.

*The Library Reference Atlas of the World.* By John Bartholomew, F.R.G.S. With General Index of 100,000 places. London: Macmillan and Co., 1890. 84 plates. *Price*, £2, 12*s.* 6*d.*

This handsome atlas deserves special attention from the public, less for novelty of treatment than for unusual balance in the representation of the countries of the world. It is emphatically *the* atlas for newspaper readers and students of contemporary changes in geography, a section of the public which unfortunately does not understand, and will not buy, maps distinguishing the varieties of physical configuration of the land. Geographers must defer to popular prejudices, and produce purely topographical and political maps; but in the present work these are exceptional in combining accuracy with great technical perfection of colour and printing. The United Kingdom is shown in a series of fourteen folio plates on the ample scale of ten miles to an inch, allowing every village and hamlet to be marked. Railways and roads are admirably brought out. The United States, usually much neglected in British atlases, appears in nine plates, each State being treated in sufficient detail to show the county boundaries, and a judicious selection of town names. There are inset maps of the environs of large cities, but these are too often sketchy. We are accustomed to large-scale maps of Canada, but have never seen clearer or more useful plates than those which here delineate the Dominion and its provinces. A new map of India in three sheets is a beautiful example of how a vast number of names can be clearly engraved, without extinguishing rivers, railways, roads, canals, or hills. This map—reduced from the Ordnance Survey—has been brought into accordance with the orthography of Hunter's *Gazetteer*, but we regret the absence of many familiar names in the old spelling which are worthy at least of a place in the index as synonyms. All the British colonies, with the exception of the islands of the West Indies, are treated in detail. The large map of Central Africa deserves special praise; and an idea of the care with which the work has been brought up to date may be gathered from the fact that Albert-Edward Nyanza, the Semliki River, and Mount Ruwenzori are represented.

The utility of a reference atlas depends wholly on the facility with which the position and relative distances of unfamiliar places can be found. The index is legible and exhaustive, and, so far as we have been able to test it, accurate. As a test of index and maps from the point of view of ready reference, we looked up forty uncommon names taken from the shipping list of a newspaper. The result was satisfactory, thirty-five of the places being found; the remaining five were insignificant headlands or local harbour names. The atlas is not perfect in every detail. The railways of Southern India and Japan are shown as they were some years ago, not as they are. There are varieties in the spelling of place-names on different maps, *e.g.* "Nova Zembla," "Novaia Zemlia," and "Novaya Zemlya"; "Soudan" and "Sudan"; "Shikoku," and "Sikok," etc., etc. The distances of trade routes marked in several maps are inconsistent. The inset plans of towns differ in scale according to no principle. The streets of St. John, N. B., and of Melbourne, are shown and named, while in the case of Auckland and Sydney the scale is too small to indicate even the suburbs. A good sketch of Valparaiso appears, but none of Buenos Ayres. Such faults are almost inseparable from a first edition, and we have little doubt that a second will speedily be called for.

(A) Plate 1.

160
140
120
100
80
60
40
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0
80
60
40
20
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ASIA
Alaska
GREENLAND
Baffin Land
Arctic Circle
DOMINION OF CANADA
Labrador
NORTH AMERICA
British Columbia
Newfoundland
Oregon
Nevada
UNITED STATES
Virginia
Carolina
Georgia
Arizona
Texas
California
Bahama Is.
Tropic of Cancer
Sandwich Is.
MEXICO
WEST INDIES
Marshall Is.
Caroline Is.
Gilbert Is.
Phœnix Is.
Solomon Is.
Ellice Is.
Marquesas
New Hebrides
Samoa Is.
Fiji Is.
Tonga
Tahiti
Tuamotu or Low Is.
New Caledonia
Queensland
N. South Wales
Victoria
Tasmania
New Zealand
VENEZUELA
Colombia
Guiana
ECUADOR
Equator
PERU
BRAZIL
Mato Grosso
SOUTH AMERICA
BOLIVIA
Minas Geraes
Tropic of Capricorn
CHILE
ARGENTINA
Patagonia
Antarctic Circle
BRITISH ISLES
FRANCE
SPAIN
Algeria
Morocco
Tripoli
Senegambia
Gaboon
Spitzbergen
Iceland
GERMANY
MAP SHOWING T
AREA OF CONTINENTAL F

# SKETCH-MAPS ILLUSTRATING THE GEOGRAPHICAL EVOLUTION OF CONTINENTAL AREAS

BY PROFESSOR JAMES GEIKIE, LL.D., D.C.L., F.R.S.

A

B

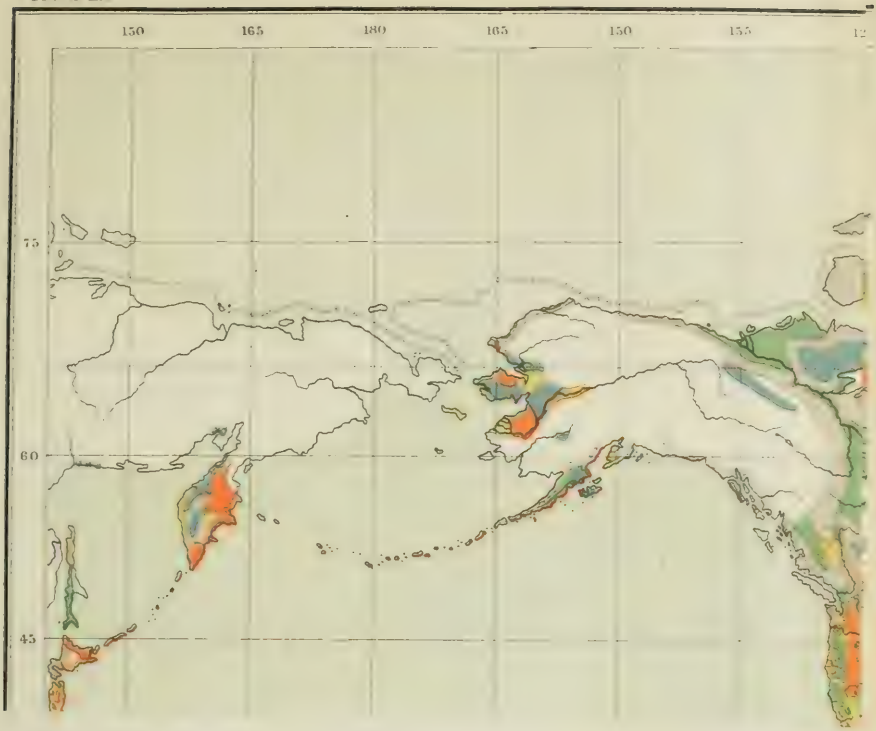
D

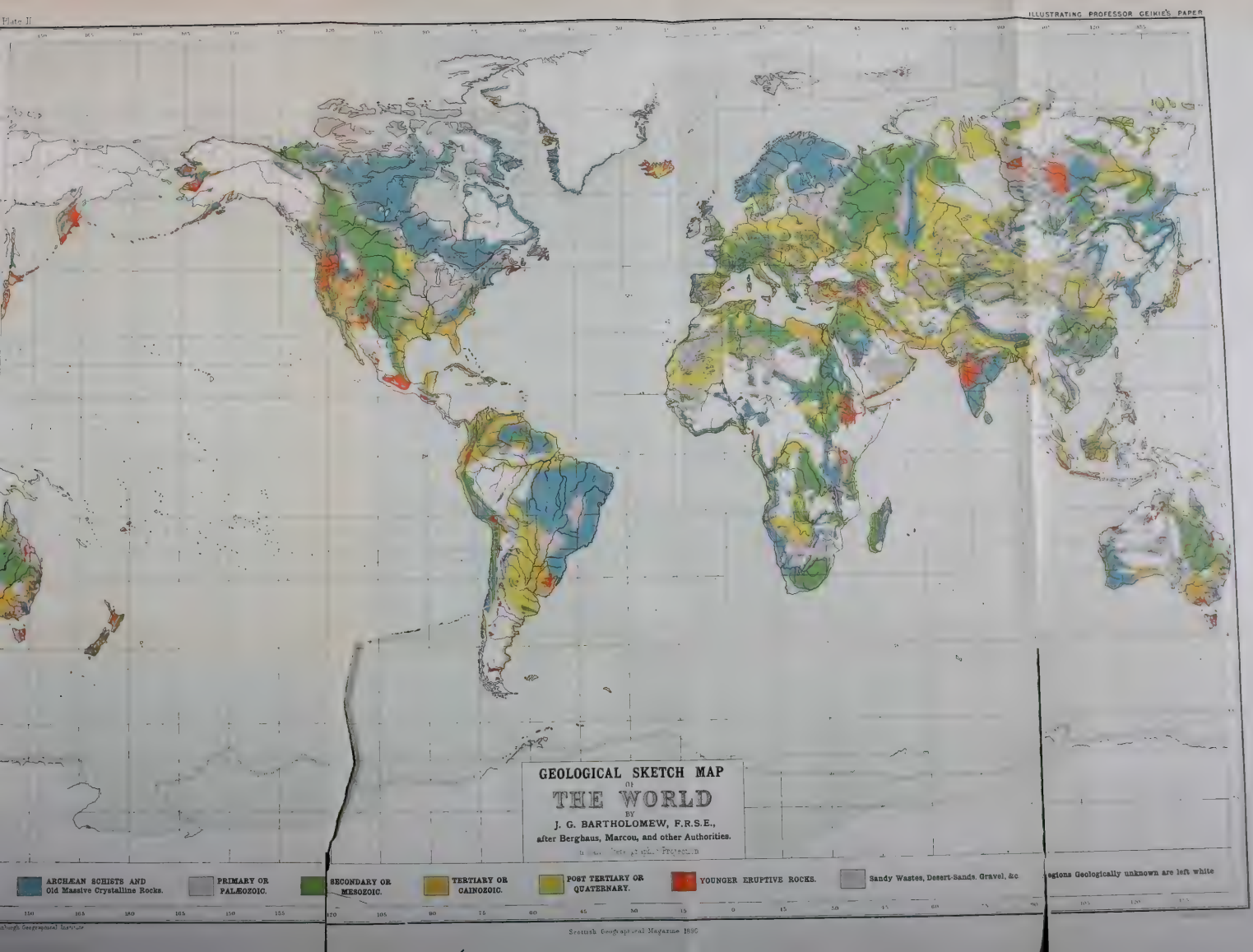
The Edinburgh Geographical Institute

Scottish Geographical Magazine 1890

John Bartholomew & Co.

Plate II.




GEOLOGICAL SKETCH MAP
OF
THE WORLD
BY
J. G. BARTHOLOMEW, F.R.S.E.,
after Berghaus, Marcou, and other Authorities.
ARCHÆAN SCHISTS AND Old Massive Crystalline Rocks.
PRIMARY OR PALÆOZOIC.
SECONDARY OR MESOZOIC.
TERTIARY OR CAINOZOIC.
POST TERTIARY OR QUATERNARY.
YOUNGER ERUPTIVE ROCKS.
Sandy Wastes, Desert-Sands, Gravel, &c.
egions Geologically unknown are left white

# THE SCOTTISH GEOGRAPHICAL MAGAZINE.

## AROUND AND ABOUT ARMENIA.

(*Read at a Meeting of the Society, 23d January* 1890.)

By Colonel Mark S. Bell, V.C., A.D.C., R.E.

I have been honoured by the Council of the Royal Scottish Geographical Society with an invitation to read a paper on Armenia, and have now pleasure in doing so. In compiling the necessary notes to this end I have kept chiefly to my own observations made in 1885-86, during which winter I visited Van, and where I remained six weeks before passing into Persia, and then through the Kurdistan and Nestorian hills to Mosul. I alone am, therefore, answerable for any opinions that I may express: for although in many cases they may be those of others, and abstracted from their writings, yet all sentiments not agreed with have been omitted, and I have treated the writings of several travellers as I would have the subjects of any conversations held with them—that is, I have noted their opinions, and used my own judgment in weeding my notes when the time came to revise them. Only after travelling through a country and living with its people can the opinions of others be thus intelligently and justifiably adopted or rejected.

Van is a large and important Armenian centre, but before describing it and Armenia generally I will briefly narrate how I reached it; for it would be of little practical use to give a sketch of Armenia without telling you how to get there, and without giving you some idea of the commercial and strategical value of its geographical position.

Leaving India in October 1885, I made Port Said, at the entrance of the Suez Canal, in thirteen days, whence I took steamer for Alexandretta, the most important harbour and roadstead of Asia Minor, on the extreme eastern shores of the Mediterranean Sea, and landed there on the 28th October, after visiting the coast towns of Jaffa, Beyrut, and Mersin.

Opinions differ as to which harbour is the most secure and the most suited to form the chief port in the north-east of the Mediterranean Sea, to which the exports of Cilicia, Anatolia, and Mesopotamia may be made to gravitate. The choice lies between Ayas, Mersin, Sakandarun, Sawadia, at the mouth of the Orontes, and Tripoli. Sakandarun, I think, occupies the situation combining the greatest strategical and commercial advantages. Its harbour is all but a natural one, and to complete it, it is only necessary to run out a breakwater. No railway projected to develop the resources and meet the trade requirements of Mesopotamia, Anatolia, and Northern Syria can be perfect unless designed to tap the fertile plains and districts around the head of the Gulf of Sakandarun, viz., the plains of Adana, of Marash, of Antioch, of Aleppo, Mesopotamia, northern Syria, Homa, Homs, etc., and this is best done from Sakandarun. Its climate is much better than most travellers have led it to be supposed, and there is ample space along the sea-shore for the site of a commercial town, and the neighbouring heights afford healthy and cool resorts in the hot season.

Before entering upon travel in Asiatic Turkey, north-east of the Gulf of Alexandretta, it is necessary to engage an interpreter who can speak Turkish and Arabic. If he can speak Armenian, Syriac, and Kurdish, so much the better. Such a man is best found at Beyrut, and, as an interpreter, cook, and general servant, will expect £6 a month, with food. All travelling kit—canteen, bed, bedding, tea, etc.—should be carried from Europe. Ordinary food such as meat, fowls, bread, eggs, etc., is cheap and abundant and good everywhere. Mules and ponies, for riding and for baggage, can be hired at about 15 piastres a day per animal (outside price). (1 lira = 18s. = 100 piastres.) Money should be brought in the form of gold or Bank of England notes.

The khan in Turkey in Asia is the inn and travellers' resort. In the plains and the low hills it consists generally of a series of double-storied buildings round a courtyard, with stables in the lower story, or in vaults excavated beneath them. The upper story is usually provided with a verandah; the rooms are ill-ventilated and completely unfurnished; the walls are generally black with soot and dirt. The Khanji, or innkeeper, is a useful man, and provides wood and water, and even food when required to do so. The above describes a khan of the best description, and such as are met with in commercial towns. In the villages travellers can find accommodation in one of the houses, the owner of which will be content with the present of half a medjedie or less (£1 = 6 medjedies).

Many khans are often nothing but low, one-storied mud buildings, man and beast finding shelter under one roof. The custom is a warm one, and is no doubt on this account adopted. It does not seem to be unhealthy, at all events during the cold season. It is, when weather permits, preferable to pitch a light tent; a light camp bed, a canteen or substitute for it, a table, chair, and rug carpet are essentials.

Before penetrating into Armenia I desired, in the first instance, to try my wings and to investigate the roads leading thither from the Gulf of Sakandarun and the nature of the harbours at the head of the gulf. The configuration of the Taurus and Anti-Taurus ranges of mountains,

the main ranges of Asia Minor, indicates Diarbekr, Harput, and Jazirah as the points most conveniently situated for gaining the high plateau of Armenia from the Aleppo waliyat and Mesopotamia. At Beyrut I had provided myself with a servant interpreter, and, accompanied by my Indian companion, Mahammad, as groom, we started for the former place by the Aintab-Severik road, a journey of fourteen stages, or 337 miles. Thence we took the road to Harput, four stages, or 93 miles, passing over the Taurus range (height of pass, 4500 feet), and descending into the fertile valley of the Farat or Euphrates before climbing the Harput Hill, elevated 4100 feet above sea-level. Difficult mule-roads passing over and through intricate hills, whose tops were already snow-clad, lead hence to the Armenian plateau, which we could have gained either by Erzingian or Bitlis, or roads between them.

We preferred, however, to defer this journey, and to recross the Taurus range (height of watershed, 4350 feet) to regain the Aleppo waliyat, and to visit Marash and Adana—a journey to Adana, connected by rail with Tarsus and the harbour of Mersin, of thirteen stages, or 316 miles.

From Adana, along the coast, by Ayas and Payas, a distance of 87 miles, we regained Sakandarun on the 7th December, after an absence of thirty-nine days.

Leaving it again on the 9th December and again traversing the Amanus range by the famous pass of the 'Iron Gates,' we visited Antioch, adjacent to the harbour of Suedia, and passed on to Aleppo, the great Western emporium of Mesopotamia, as Baghdad is its Eastern mart—a journey of six stages or 121 miles.

We had thus far been chiefly travelling in the Aleppo Waliyat, a rich district with an area of about 300,000 square miles and a population of about 1,000,000, of whom probably one-fifth are Christians, chiefly Armenians: Kurds and Arabs are likewise numerous. The main Christian centres visited were about Adana, Aintab, Diarbekr, Harput, Marash, and Antioch, where in each and all I was most hospitably received by the American missionaries, a most estimable body of common-sense Christian heroes doing an excellent work. The authorities take interest in the movements of travellers, and report their progress to Constantinople *à la Turque*, and by the time I arrived at Aleppo I was multiplied into three Englishmen; and Jumil Pasha, then Wali of the Aleppo Waliyat, showed his zeal in a manner only possible to an Oriental, by representing to Constantinople that the three in one, my humble self, had come from three different directions on some sinister business. There is but one step from the sublime to the ridiculous, and this report of a trusted subordinate so terrified the Sublime, but for the nonce, ridiculous Porte, that she laid her fears before our Minister, by whom I was called upon to divulge my deep-laid plans. My answer was a simple one: "I am an officer travelling with leave from India bent upon visiting the chief towns of Mesopotamia, Armenia, and Kurdistan, and doing so to my own complete satisfaction, without troubling the authorities for escorts which I do not want, and with as much expedition as possible." Both Mahammad and I were armed with revolvers and cavalry

carbines, carried suspended from the saddle in buckets, and felt ourselves equal to any number of highwaymen. It was my expeditious energy hathad so alarmed the phlegmatic Turk.

Leaving Aleppo we made a fair start for Van, here called Wan, in Armenia, hiring mules for the through journey, and taking the road *viâ* Mardin, the Tor Abdin, Jazirah, Sairdt, and Bitlis. Bidding adieu to our hospitable host, Mr. Henderson, then Consul of Aleppo, and his charming wife, on the 26th December, we gained Mardin, thirteen stages, (309 miles) the day after Christmas, and Jazirah, another five stages (105 miles) on the 2d of January 1886. This country traversed between Sakandarun, Diarbekr, Harput, Adana, Aleppo, and Jazirah is one with its future before it. Such an extent of country with such a generally rich soil, and consisting of valleys, plains, and hills, is rarely met with; but it is inhabited by but one-twentieth of the population it is capable of supporting, and is in consequence much neglected. Its population may be assumed to be under twenty per square mile. Europeans could colonise Anatolia, Armenia, and certain parts of Kurdistan, and our Indian subjects Mesopotamia. None need starve, the necessaries and even luxuries of life are so cheap: bread, ½d. to ¾d. a lb.; meat, 2d. a lb.; eggs, five to six a penny; grapes, ½d. a lb.; oranges, fourteen a penny. Its produce is most varied, and consists of various grains, fruits (figs, grapes, oranges, olives, etc.), sheep, cattle, silk, gall-nuts, etc. etc. The weather was pleasant during November and December till Diarbekr was reached. It then became cheerless, cold, and rainy. During December the weather was fine but cold.

Having now taken you rapidly along with me to Diarbekr, Harput, and Jazirah, the main gates of Armenia from the Mediterranean Sea, I must say a few words on the roads leading into it, for by some Armenia may be taken to extend even to Diarbekr, that walled town of extreme political and strategic importance, well known to the Romans, and dominating both Mesopotamia and Syria. First, then, from the Diarbekr entrance, the country to the southward of which is gently undulating to Mardin, a centre of 20,000 souls, half of whom are Christians (Jacobites, Catholic Armenians, etc.), and below which town lies the vast plain of Mesopotamia. To its eastwards, as far as Jazirah, lies the Tor Abdin, a mass of rolling limestone hills containing fertile valleys and plateaux, a volcanic formation extending from Urfa to Zakho, and largely inhabited by Jacobite Christians as well as Kurds, etc. To the curved line Chermak, Arghana, Hani, Hazu, Sairdt, the country is flat or gently undulating, and is known as the Plateau or Dasht.

A difficult and mountainous country fills the triangle Palu, Sairdt, Bitlis, Mush. It will be seen from the above that the roads Diarbekr to Sairdt, Diarbekr by Kizin to Palu, on the Euphrates, etc., present no difficulties, and that the direct road, Diarbekr to Mush, is in part difficult and mountainous.

The country included in the triangle Besné, Chermak, Malatia, is hilly and difficult to traverse. The most direct road to Erzerum can be traversed in summer only, and goes through Hani and Jambak. Another

difficult but also direct road goes by Palu, Horhor, Melikhan, and Bash Kui.

Harput, the next point of departure to be considered, is a town of 1800 Turk and 900 Armenian houses, with a population of 13,000 souls, and the centre of a large and populous Christian area. All roads crossing the Taurus between it and Diarbekr, with the exception of the carriage road, are steep and difficult mule-tracks.

The Taurus ends at the Euphrates, and here the Anti-Taurus range commences. To the immediate north and east of Harput the latter is a tumbled mass of a barren and rocky appearance, with narrow valleys. In November, snow lies mostly on the hills in a direction of 340°, and more or less round to 85°.

The road to Van along the Euphrates by Palu and Mush is not a difficult one, although two spurs of hills are crossed. Palu is of importance because it is at the head of the gorge of the river, and blocks the outlets of the summer passes from Erzerum *viâ* Melikhan, and from Van by Mush. A carriage road connects it with Diarbekr, and will eventually extend by Severik and Aintab to Aleppo and Sakandarun. To the northward this road runs through Malatia and Sivas (60 hours) to Samsun, on the Black Sea (130 hours).

The direct summer road to Erzinghian, through Pertek, Khozat, Saiyid, Mazur, is a difficult mule-track. The road by Arabkir and Egin is that generally taken. From Erzinghian to Erzerum the road is more or less a made one.

Van is also reached by Peri, Kighi Kassaba, the Binguel-dagh, Khanus and Mush; a pleasant summer journey, easy for mules, well wooded in places.

These roads from Van to Harput are important ones, considering the ease with which the Lake Van neighbourhood can be reached from Erivan and Kars, and the abundance of grains, fodder, and firewood to be obtained, each in season, and in its appropriate district; grains and fodder from the plains of Mush, Bulanik, Khanus, about Lake Van, etc.; firewood about the Binguel-dagh.

The Dersim Kurds occupy the hills to the northward. They are Shiah Mahammadans, but partially subdued, and few Turks dare venture into their rugged hills except in numbers and well armed. Armenians are scattered along the line, between Harput, Gighi, Erzerum, Passin, Khanus Kal'asi, Mush, Bitlis, Van, and Bayazid, and number about half-a-million souls.

The Kurds occupying the Dersim Hills and the mountains on either side of the rich Harput plains for long exercised a sort of suzerainty over the neighbouring Armenians, the chiefs exacting tribute from them, each from a certain number of villages. To within forty years they have exacted taxes from them. When the opportunity offers, these Kurds become troublesome, as by nature they are plunderers, and only kept in order by fear and force. In the region of Chemishgezek, 30 miles to northward of Harput, are Kurds known as Kizilbash or Red-heads, a peculiar people about whose origin there is some obscurity. There alone they number some forty-five or fifty clans and about 100,000 souls. They also are in

considerable numbers about Arabkir, Gozgat. They lean towards Christianity, and are no followers of Mahammad except by compulsion. Their villages have no mosques, and they never say their prayers unless a Muslim is present. Indeed, their religion is a mixture of Christianity, Muslimism, and heathenism. Although despised and said to carry on midnight orgies, they are probably as moral as any race in Asia Minor, and are not as licentious as Muslims and Greeks. A Kizilbash may marry whom he chooses, even his grandmother. Polygamy is not allowed, and adultery and rape are punishable with death. They believe in the transmigration of souls, and baptize their children in the name of Ali (Christ), and have an ordinance like that of the Holy Sacrament. Some consider that they lean towards Christianity in order to gain the protection of the English Ambassador at Constantinople and release from military service. They are a race of splendid physique. The Kurds and Kizilbash here would seem to belong to one and the same stock, their religion being the same and the Kizilbash being probably Kurds who have long since left a nomad for a village and agricultural life, and thus come into constant contact with Turks, and, having but little intercourse with the mountain Kurds, have for the most part lost their mother-tongue. The Kurds have long, oval faces, dark-brown eyes : nose aquiline, hooked downwards at the end ; large and strongly-lined nostrils. The men sometimes shave the hair in front and leave it long behind. The women generally have black elf locks hanging down. I have seen a Kurdish maiden, however, with bright red hair.

Their villages are half sunk, and resemble ant-hills, earth being piled up over the tops and sides of the houses. Within, these houses are no better than rabbit-warrens, or mud-burrows round about earthen mounds. The rooms are low, and those occupied by the family interspersed with those in which the cattle and horses, etc., are stabled. The traveller occupies a slightly raised platform in the corner of one of them surrounded by cattle. There is no ventilation to speak of. During the severe winter of Armenia and Kurdistan the animal heat of the cattle warms the dwelling throughout at this season ; on opening the one outside door a cloud of mist forms by condensation. I kept to my tent so long as I could, but with an outdoor temperature of 20° F. I did not find the stable accommodation unpleasant. These houses must in the summer swarm with all manner of vermin. If occupied then, it is best to sling a hammock.

Jazirah is the next point of departure to be considered for entering Armenia. One route ascends the Tigris and its tributary valleys to Sairdt, a difficult road, whence it crosses the pass, elevated 4400 feet, leading to the Bitlis-su, which river it ascends through Bitlis, gaining the Armenian plateau at Lake Van. Sairdt, elevated 2900 feet, a town of 12,000 to 14,000 inhabitants, of whom 3000 are Christians, lies in a hilly trough surrounded by higher hills distant on an average 15 to 20 miles. Its climate is healthy, and its fertile soil, of clay over limestone, grows grains and fruits plentifully ; wood and water are, however, scarce. As an outpost to Diarbekr, with good roads to it and Palu, it is of importance. A cart-road is projected to Bitlis, which, when made,

will place it in good communication with the coast at Trebizond and Sakandarun.

Bitlis, a town of 30,000 inhabitants, of whom 10,000 are Christians, lies in a hollow in the hills, which rise 2000 feet over it, and it results from the peculiarity of its situation that snow accumulates about it to such an extent that horses cannot be taken out of their stables for months together. Its climate is cool in summer, and dry in winter, and here the produce both of the warm plains of Mesopotamia and the temperate plateau of Armenia is obtainable. The roads to the northward of Bitlis are such that wheels could traverse them during the summer to Mush, Erzerum, Van, etc. They are well suited for sledges in the winter. It is seven stages to Bitlis from Jazirah, or 138 miles, and 16 miles on to Lake Van, elevated 5300 feet at Tadvan. Hence two roads lead to Van, one round the north of the lake, the easier, but a journey of 36 post hours of $4\frac{1}{4}$ miles each, the other by the south of the lake, of 24 post hours. The latter, but more hilly road, would be invariably taken in summer: the former is the winter route, and was on this account selected. It passes over an easy country, with a fertile volcanic soil, under the shadow of the Nimrud-dagh, a huge volcano, with a crater measuring 5 miles either way, and the more imposing-looking Sipan-dagh, rising 7000 feet above the lake. In many places when traversed in January the snow lay two feet deep. The water of the lake is heavy and impregnated with salt and carbonate of soda and potash. It is navigated by boats of a very clumsy flat-bottomed build, which sail very badly.

The walled town of Van has a circumference of about 3000 yards; on its south rises the rock of Van, on which lies the citadel. It is 1900 yards long, and rises perpendicularly to a height of 300 to 400 feet, a magnificent land-mark situated in a fertile plain of considerable extent. Its houses are of mud, generally double-storied, with flat roofs; its streets are narrow and winding, and its bazaars of no size or importance. Its foundation is attributed to Semiramis. The Van gardens, where the officials and the well-to-do reside, extend for a distance of 5 miles by a breadth of 2 to 3 miles, and contain many pretty avenues bordered by two lines of poplars, and watered by brooks. The gardens are cleaner than the town and other agglomerations of residences; yet the streets are used sufficiently as drains and water-closets to seriously contaminate the open channel water supply, into which refuse must find its way.

Its garrison, in 1886, numbered 3500 infantry. They were well fed but not paid, and were badly lodged. About 3 per cent. were in hospital.

The harbour is at Avantz, $\frac{3}{4}$ mile from the town, and consists of a small breakwater; so shelving is the shore that 400 yards out there is only a depth of 4 feet.

The town contains 24,000 Christians, and 8000 Mussulmans. There are many fairly wealthy men amongst the Armenians—that is, men with £10,000. As there is but little trade, most of the profits must arise from usury: indeed Armenians are said to thrive where Jews would starve, such sharp men of business are they.

To the south of Lake Van is a mountainous district with summits

rising 2000 to 3000 feet above the lake, beyond which lie the populous and fertile valleys of Nurduz, Schatak, and Meukus. Snow in winter lies deep on the border ranges, preventing communication across them to these valleys, except by foot passengers, who can always pass from December to April; during the remaining months of the year baggage animals can pass readily. From the Rahwan to the Mush plain on the west, the Van plain on the east, and northward to Erzerum and the frontier between Turkey and Russia, the country is such that it can be traversed, for the most part, by the heavy rough wooden wheeled carts of the country, it being an upland plateau diversified by plains, valleys, and hills: all its hills can be turned by comparatively easy routes. Westward of the Mush, Khanus plain, to the Dersim Hills, the topographical features of the country present no great obstacle to free movement. From the Dersim and the Euphrates to north, south, and west, the hills are higher, and the winter snows are more lasting. The post, carried on ponies from Trebizond, the port for Van on the Black Sea, *viâ* Erzerum, Ardish, Khanus, and Hassan Kal'a, was never delayed by snow during the winter of 1885-86. The severity of the winter over this region is such, however, as to prevent any considerable military operations being carried on over it during the months of December and March. Minor operations across it are, it is considered, quite possible to an enterprising enemy.

In January and February 1886 the night minimum at Van varied between zero and 20°, and the temperature at 9 A.M. between 24° and 36°, and at 4 P.M. between 25° and 40°.

The population of the Van Valiyat is in round numbers:—

| | | |
|---|---|---|
| Armenians, | 137,000 | 210,000 Christians. |
| Nestorians, | 73,000 | |
| Kurds and Turks, | 130,000 | Muslims. |
| | 340,000 | Total. |

In this part of Asia Minor the population possibly does not exceed 20 per square mile on an average.

Let us now consider how Armenia can be reached by railway. In countries such as Asia Minor we must bear in mind that commerce has in the course of ages selected the routes best suited for her needs, and that the traffic of men and animals along these old-world trade routes has worn them into the paths of the present day. Man has done little to improve them. The chief of these have now been converted into roads for wheels. These roads indicate the approximate lines of railway in the future, for they pass through the chief commercial and strategic centres. The main lines leading into Armenia I have already spoken of. The first of these to be converted into railroads will undoubtedly be those leading to Diarbekr, from the Mediterranean and Black Seas and the Sea of Marmora. Diarbekr, the Roman Amida, is a point of such great commercial and strategic importance, its site being eminently suited for conversion into a strong entrenched position as a support to Armenia and an outpost to Mesopotamia and Syria, that it must become a railway centre in the future. Water only is required to convert the grassy plains around it into corn fields.

It is best reached from the Mediterranean Sea from Mersin, Sakandarun, and Antioch by an extension of the Mersin-Adana line to Sakandarun, and thence by Aleppo, Urfa, and Mardin. From Diarbekr a railway can reach the Black Sea *viâ* Malatiâ, Sivas, and Tokat, to Samsun. From this latter line the geographical features of the country favour branches into Armenia from Sivas *viâ* Erzinghian to Erzerum, from Harput *viâ* Mush to Van, and from the Mardin-Mosul line to Jazirah and Bitlis, gaining an access to the Armenian plateau at Rahwan by the valley of the Tigris and its tributary the Bitlis-su. These main lines are now the chief roads traversable by wheels reaching Armenia, with the exception of that from Trebizond to Erzerum, and thence towards Tabriz and Van.

I will here say a word about the "Euphrates Valley Railway," as it will influence the future of Armenia. The term is not a happy one, for when we consider our imperial highways it seems to divert our attention into a wrong course. The British imperial highway to India is the line as yet untrodden, in a modern sense, *viâ* the Mediterranean Sea and Mesopotamia (Urfa, Mardin, Nisibin, Mosul) to Baghdad and the Persian Gulf, and from Mosul through Mid-Persia to join on with the Indian rails extended to Sistan so as to develop Beluchistan. This route is necessary to the development of these countries, their better government, and the future trade requirements of the world, but more especially to those of India, our Australian colonies, and China. Time is now ripe for it. Together with the Canadian route it represents a body, Great Britain, with outstretched arms, and constitutes a girdle round the earth strongly supported at short intervals by the vast continents of Canada, Asia Minor and Persia, India and Australia; and the military positions of Gibraltar, Malta, and Cyprus. This consideration alone points to the bond that must eventually bind Asia Minor and Persia to Great Britain. The only section of this route yet untrodden is that across Asia Minor and Persia; the line that its development should take is determined by the principles that it must be a commercial and strategic route, and open up the greatest possible extent of country. No direct line from the Mediterranean Sea *viâ* the Euphrates Valley can ever be a commercial or a profitable undertaking; but a line as indicated, skirting northern Syria and Mesopotamia, will at once earn a dividend as far as Urfa, and will eventually pay throughout its entire length as the government of the country improves, population increases, and settlements are formed along it. It traverses a country that in ancient days was richly cultivated.

There are several convents of interest about Van—of that at Varak, five miles from Van, the upper convent was founded A.D. 300 by Eripxima and her thirty virgins, who fled there after visiting Jerusalem to escape the amorous offers of a heathen monarch. The main architectural features of the lower convent consist of lofty square pillars supporting semicircular arches and domed roofs fluted out below. The old portion of rubble masonry, plastered, was built about 500 A.D., and the new, of squared stone, about 900 A.D. The pillars are covered with paintings of Constantine and the Greek monarchs. On them are also carved rough crosses—some well executed, others the work of juvenile artists. The woodwork of the inner door, an agglomeration of crosses of various

patterns, is well designed. There is also a stone similarly carved and well fretted in the old portion of the church. The school contained fifteen to twenty cold, dirty boys, who sang loudly, making horrible grimaces. Beyond this questionable harmony, they do not appear to learn much. This inharmonious shouting was strangely in contrast with the well-trained voices of the Armenian girls trained by American missionary ladies. Many a pleasant Sunday evening have I spent listening to them singing hymns, and entertaining them in turn with tales of Indian adventure and customs. The vartabed or priest entertained us in the selamlik, or room of reception, with yaurt (curds) and honey, dried cream cakes, and honey and wine. Drinking to me, the vartabed said that our Queen was a kind lady who loved other Christians besides her own. The head Armenian priest was then toasted. The vartabeds were poorly clad and dirty; the only guardians of the convent are the watch-dogs, which are noted for strength and intelligence. The library here is of interest, and although many of its old and valuable works have been burnt, still upwards of 1000 volumes remain. One, a history of Alexander's conquests, given to the convent in 1803, is an amazingly and interestingly illustrated work.

The monastery of Akhtomar, where the Catholicos lives, is situated on a small island, a two-hours' journey by boat from Vank Haikvank, 37 miles from Van, which we reached after a pleasant canter over the snow on sure-footed ponies. Our greeting was an interesting and picturesque one. Three priests with banners, and wearing veils and singing hymns, wound down the incline leading to the water's edge to meet us. There is no indication of wealth, yet the Catholicos had recently been robbed of £10,000. No man dare show affluence in Asia Minor.

The Narik convent is an hour's canter over snow from Vank Haikvank. The body of the structure is of coralline and leaf limestone, a water deposit. Its pillars are rectangular, 20 feet high, and support semicircular arches of about 10 feet span, on which rest the domes, which are surrounded by clerestory windows; age, 500 to 800 A.D. The villages about Akhtomar were taken by the Kurds from the Armenians 50 to 100 years ago.

The Armenian Church is one of the oldest Eastern Christian Churches not in communion with the Orthodox Greek Church, or with the Church of Rome. The Armenians adopted the views of the Monophysites, of one nature and one person in Christ; their separation from the Orthodox Eastern Church was as much political as doctrinal, since it arose in great measure from the attempt of the Greeks to assert their ecclesiastical supremacy over other races. Their spiritual head is the Patriarch of Etchmiadzin, which place is now within the borders of Russian Armenia, and from which they draw no small advantage; but those who reside in the Turkish dominions are directly subject to the Armenian Patriarch of Constantinople.

The subtle Eastern mind is particularly fond of interesting itself in the intricacies of theological teachings, and the numerous sects of Christians scattered throughout Turkey in Asia are lamentable instances of man's foolishness in endeavouring to formulate dogmas concerning matters

beyond his sphere of comprehension, and belonging to the knowledge of those who have passed beyond the world of mortals into that of the immortals. To the solution of the Eastern question the proper understanding of the Eastern creeds, the Armenian, Nestorian, Greek, etc., is very necessary. Much as we may despise those who grasp the shadow and lose the substance, who allow doctrinal questions, raised by abstruse thinkers, cursed with fantastic minds, to serve as stumbling-blocks to the acceptance of the simplicity of Christianity, yet in the subtle brain of the Eastern these niceties of incomprehensible creeds, which must be as "clear as mud" to them, find a favourable soil, and are received as all-important, and simple Christianity is considered to be of very secondary and minor importance.

Let me now say a few words about the general geography, races, and history of Armenia, or on that important subject known as Political Geography.

Armenia in older days extended from the Caucasus to Mesopotamia, and to Anatolia, or Asia Minor: it is the roof of Western Asia, the source of its chief rivers, and whence they flow in different directions—the Euphrates and Tigris to the Persian Gulf, and the Araxes to the Caspian. Its elevation above the sea is everywhere great, reaching to 6000 feet in its NW. section, about Erzerum and Ararat, etc. The Armenian high plateau is naturally fertile, producing grains, cotton, tobacco, and grapes, but it is much neglected and without roads, and its surplus growth of grains, etc., cannot be exported; and although its inhabitants may be rich in food-stuffs, they are poor in all other necessaries of life, and more so in its luxuries. Northern Europeans here find a climate more congenial to them than that of Italy or the south of Spain. It is rich in romantic scenery and luxuriant pasture. Lofty ranges of sterile mountains, with peaks of upwards of 13,000 feet in height, are interspersed with fertile vales, extended plains, and rolling prairie. In violent contrasts it is second only to Central Asia, where the most fertile oases and the barrenest of wastes are found in juxtaposition. Where the territories of Persia, Russia, and Turkey, touch in NE. Armenia, Ararat, with its summit covered with perpetual ice and snow, rises above the plain at its base to a height of 14,320 feet. Its climate varies in intensity from the heat of the Mesopotamian plains, where the mercury in summer rises, for a few days, to 120°, to that of the plateau of Erzerum, where a winter-night minimum of zero is common. It abounded in ancient times in large and important towns, such as Armavir, to the north of the Araxes, Erovantashad, Pakaran, Valarsabad, Shiragavan, Ani, the ruins of which latter testify to its former magnificence. Van, Erzerum, Nakhjuan, Amid, and Pakovan, were then important cities. The link in geographical position between the great central plateaux of Asia and Anatolia, between the Oriental monarchies of Persia and Parthia on one side, and Greece and Rome on the other, Armenia has been the arena of continual struggles, and has suffered in proportion. These struggles, the march of history teaches us, are likely to repeat themselves.

It is now divided between Turkey, Russia, and Persia. The Turkish portion is principally included in the government of Erzerum, the Persian

in that of Azarbaijan, and the Russian in that of Erivan. The chief towns in the first are Erzerum and Van; in the second, Urumiah; and in the last Erivan, Etchmiadzin, Ordubad, and Alexandropol.

Armenia has, as stated, been several times laid waste, and its inhabitants transplanted. In the days of Shah Abbas, in 1604, about 40,000 were forced to emigrate to the vicinity of Isfahan, where they are principally settled in Julfa. As the Armenians migrated by force, necessity, or free will, to avoid their Mohammadan neighbours, the Kurds replaced them. This substitution of Kurds for Armenians is still going on. Besides the Kurds, in Armenia are found Turks, Arabs, Christians of the Nestorian, Chaldean, Greek, and other persuasions, and as well the Kizilbash, already alluded to, and Yezidis. These latter, found chiefly in its southern districts and borders, and in the valley of the Tigris, are Kurds, and the so-called worshippers of the Evil Spirit, an image of whom they are said to reverence in the form of a peacock. I visited their chief shrine at Shaikh Adi, after passing through the centre of the Kurdistan hills. The shaikh received me well. His face is not of a high type, and that of his eldest son (he has two) no improvement on it. His manner, although denoting impatience at times, is sufficiently dignified. He is ignorant, considering his position, and understands very little Arabic or Turkish. His followers, I was told, obey him implicitly, an obedience which can only be accounted for by their extreme ignorance. The Shaikh reads the Yezidi scriptures to those who visit him, a work that treats of the lives of Mola Haidar, Mola Barkat, etc. Shaikh Adi brought the light, wrote the book, and recorded the lives of these saints. The Yezidis never pray, and there are no places of worship in their villages. The Shaikh would give me no statistics of his people, but simply remarked that they were scattered between Mosul, Sinjar, and Jazirah, and that "no man in Turkey spoke the truth when called upon for statistics, and if a man had four sons he said that he had two." I naturally ceased to question him. This strange people are well disposed towards the British, by reason of the amelioration of their position obtained by Sir H. Layard, and their good-will is not to be despised, as they form a numerous community, altogether at the disposal of their shaikh, whose will, as stated, they obey without question. The sanctity of work would appear to be one of their tenets, for the shaikh's son headed the fatigue party told off to gather firewood for the day. Streams of villagers, with their village produce laden on donkeys, were met bringing in supplies to the shrine; a vaulted stone building, with a cold, dark, damp, oil-bespattered interior, of no architectural pretensions, and capped by characteristic cones.

The Armenians belong to the Aryan race, and as such are kinsmen to their neighbours the Kurds, who are probably descended from the Parthians. Both races are natives of these regions, but the Armenians are those who have benefited the country through their culture and civilisation, and as for the Kurds, they are always known as having trodden down the grass which their flocks left untouched. The total number[1] of

[1] In all they number about 4 millions, of whom 450,000 are in Constantinople and Roumelia, 1,000,000 in Russia, 400,000 in Persia, and the rest scattered over India, Austria, etc.

Armenians scattered over Asia Minor may be taken to equal 2 millions to 2¼ millions. According to their own legendary history, they are the descendants of Haik, a son of Togarmah, grandson of Japhet.

The family is the basis of society amongst the Armenians, and is of a patriarchal nature, woman taking a high place in the home, so soon as her quaint novitiate as a married woman has been passed. As all the male members of the family, as they marry, bring their brides to live under the parental roof, it becomes necessary to instruct each in turn in the necessity and virtue of silence, so difficult to the fair sex. Until childbirth the bride is the drudge and slave of all, and is allowed to converse only with her husband. She first enjoys converse with her child, then with the females of the house, and only after several years may she talk freely. Eventually she may become head and ruler of the family, if left a widow. In churches the women are hidden away in galleries, and behind trellis-work. They veil when abroad, but many are the pretty black eyes that I have seen flashing unutterable nothings as the veil was momentarily drawn aside—the hideous white sheet which veils their beauty. The wearing of the veil is not natural to the Armenians, but the necessary consequence of living amongst Muslims. An uncovered woman is considered to be a bad woman. Harlots alone wear black. If a man walked arm-in-arm with his wife, the small boys would jeer and pelt him with mud and stones. The proper thing to do is to walk a distance one behind the other. Cousins look upon each other as brothers and sisters, and marriage is prohibited between great-grandchildren, and even the seventh generation of the same pair. The best man at an Armenian wedding acts as the godfather to all children of the marriage, and becomes a near relation to the contracting parties, being unable to marry into the family. I saw several marriage feasts. They last several days, and the bridegroom, we should judge, had a poor time of it, his fellows parading the streets with him, and generally playing the buffoon around about him. I was present at a marriage conducted by a priest aided by a bishop. They wore handsomely embroidered, but dirty vestments, and their bodies and clothes were filthy. Many candles were lighted; the bride was covered, and the man confessed, and the holy sacrament was administered to him. Their churches are all very much alike: an outer courtyard; two rows of poplar pillars support the roof and form aisles; whitewashed walls, pictures, and communion-table. There are galleries for women; the floor is covered with dirty strips of carpets, and racks are provided for the shoes of the congregation. Dust, fleas, and dirt everywhere.

The prevailing diseases in towns such as Van are ophthalmia, small-pox, and typhus. Small-pox, chicken-pox, and typhus, etc., are always endemic in the garrison towns, and they occasionally become epidemic when the predisposing causes are favourable. About one-half of the children suffer from ophthalmia, and many of them are blinded by it. It is caused by the glare of the sun and snow, and the smoke arising from the use of a central hole in the roof as a chimney.

Living in Armenia is cheap. A valet and cook's wages are £1, 7s. a month, with food; a groom's, 18s. Meat costs 2½d. a lb., chickens 5½d.

each, and wine 2½d. a quart bottle. The greatest taxation in the town amounts to about £5 a family and tithes. The villagers complain of heavy taxation, *i.e.* 5s. 6d. per male (military exemption tax), house-tax 4 per cent. on its value, ⅛th of the produce of the crops, and 7½d. on each sheep. Their indirect taxation is large, and grain and other produce does not pay for its transport to the sea—consequently there are no markets for their agricultural produce, and beyond a little cloth nothing much is manufactured locally.

The Armenian race is perhaps possessed of no very excellent or noble qualities. Taken as a mass, they have not sufficient education or force of character to enable them to argue out matters intelligently. It must be remembered that they are Orientals, and one of their characteristics, in common with all Asiatics, is to lie from childhood, their religion exercising no moral restraint over them. They are sharp-witted as traffickers and business men. Self-respect does not hinder them from taking all they can and giving in return as little as possible. They are economical even to meanness: a man will allow wife, child, or relative to die rather than spend money on a doctor, on medicine, or on medical comforts. The richest families in Van, possessing £10,000 or more, will not disburse more than £3 or £4 monthly. A cow or a buffalo or two, and a few fowls, are quartered in their houses, and supply milk and eggs. A vineyard, a few fields, and a garden will supply most of their other food requirements. They have a certain ambition, and desire to become a nation. Intrigue is not unknown to them; indeed, it is said to be very prevalent; but they cannot trust each other, and one will betray the other. They have no head, no organisation or cohesive power, and even two men cannot keep in business partnership together for a short term of years. On the council of the Wáli the Armenian representative will be generally found to be his tool, for if selected by popular vote the Wali soon finds an excuse for getting rid of him. In a few words, they are generally supposed to be a people without any backbone. The man must be born who shall weld them into unity, for at present there is but little individual respect for one another amongst them.

These are the characteristics that I gathered as those most prevalent amongst the Armenian people, and they are those that must result from centuries of oppression and misfortune. Others have made more favourable estimates of them. With freedom, the nobler qualities of a free people must in time result.[1] There are so many Armenians living contentedly under Russian rule, and enjoying a higher status and civilisation than those in Asia Minor and Persia, that they must of necessity influence their brethren in these countries. For many years the Russian Consul at Van was an Armenian—a significant appointment, so distasteful to the Turks that he was removed to Syria. Russia has con-

[1] 'The state of society in these countries (East) is such that, however much virtue may be admired in the abstract, it is thought imprudent generally to practise it. A wise parent gives his son a sort of Janus education, telling him of a few virtues, but initiating him into the mysteries of every vice, in order that he may be a match for his demoralised neighbours; and thus nearly everybody commences life prepared to be faithful to his friends, and an honest man or rogue to the world, as may be.'—*Conolly.*

siderable power and influence in the neighbourhood. About Van the Armenians are a fine race, well fitted for the ranks. The villagers would not object to serve, provided they served and fought side by side with a Christian power.

There can be no denying the religious fervour of the Armenians, and through much persecution they have held to their religion with exemplary tenacity. The sojourner in Van is awaked before dawn on the coldest winter morn by loud rappings at every door in the neighbourhood calling the devout to early prayer, and by the clanging of their wooden gongs, which in Armenia take the place of bells, the Turks arrogating to themselves the use of the latter.

Intimately connected with Armenia is Kurdistan, chiefly comprised in the province of Hakkiari, inhabited for the greater part by Kurds and Nestorians. The Kurds now occupying Asia Minor may be numbered at 1,500,000, and in Persia at 750,000—in all $2\frac{1}{4}$ millions of souls. Kurdistan is almost as much a name only as Armenia. The geographical limits of neither country can be defined. Both peoples are widely scattered, from the Bay of Sakandarun to Lake Urumiah and the Kaukasus, and as far south as Mosul. A line drawn south of Lake Van to Khoi may be taken to separate Kurdistan proper from Armenia. In its northern portions, with which alone we are here concerned, it is extremely mountainous, and traversed by but few roads, and these exceedingly difficult mule-paths. By some, Kurdistan may be considered to extend from Erzerum to the Jabal Hamrin, *i.e.* from the Kaukasus to the neighbourhood of Mosul. In these mountains dwelt the ancient Karduki, who opposed the retreat of the Ten Thousand. From the time of Alexander to the present day they have maintained themselves in their original seats, notwithstanding all the changes that have passed over Western Asia, and have been included within the various empires that have successively held sway there, Greek, Roman, Parthian, Byzantine, Saracen, Persian, and Turkish, though owing but a partial and temporary allegiance to any of them, and maintaining a semi-independence under their local chieftains. The Turks have them now fairly well in hand. Physically they are a handsome race, of middle height, with slim, lithe figures, well-cut features, bright black eyes, spare beards, and thick moustaches. The women have expressive black eyes, thick and glossy hair, a fine figure, dark complexion, and an aquiline nose. These characteristics contrast with those of the Armenian sheep-like features, with their large noses and ponderous, yet often handsome, physiognomies. The Kurds, like the nomadic Arabs, think little of the Harem system.

When passing from Mosul to Kirmanshah, I saw in Persian Kurdistan one of the loveliest girls whom I have ever beheld, with eyes that haunted me for days. The Lur women here have raven black hair, and are well-favoured. They enjoy perfect liberty, and are merry and talkative. Their head-dress consists of a red skull-cap set with coins; their dress of a long blouse tied in at the waist, and generally of red cotton stuff. They wear no pantaloons, and when walking the leg to the knee is often exposed. I here enjoyed, in the border hills of Turkey and Persia, the pleasure, so rare in either country, of the society of the Muslim women, who freely

came to converse with and wonder at the stranger whom they so rarely see and to obtain eye-lotion, many of them suffering from ophthalmia. They would watch my ablutions, and their chief surprise was that my skin was so fair.

The Kurds are well represented in Armenia, and opinions differ with respect to them very widely. Some consider them to be an intelligent race, capable, with education, of excelling in the arts and sciences, and of becoming able administrators. The Turks consider them to have the making of good soldiers; certainly under strict discipline they are capable of becoming as efficient as our best Indian troops. The intelligence and manly character of the Kurds settled in villages are said by some to be less than those who follow a nomad life. Again, on this point, opinions differ. As a mass they are ignorant. They despise civilisation, and dislike the Turks. They have all the virtues and vices of uneducated nomads and children of nature. The majority are Mussulmans, although they do not observe all the customs that the Turks do. Again, many are very devout Muslims. Their women lead active lives, have influence in the tribe, and are an improvement on those of the harem. Kurdistan is a barren country, where agriculture is little practised, and where pasturage is the chief resource which furnishes its inhabitants with means of subsistence. Recruits are taken from the Bhotân and other tribes well in hand, but not from the frontier tribes; these during war serve as irregulars, and are then more feared by the peaceful villagers, whom they loot and ill-treat without mercy, than the enemy, for whose close presence they are said to have no stomach. During their presence at such times in a Christian town or village, a massacre is much to be feared. The loyalty of the Dersim and other Kurds is questioned. They in seasons of trouble gather round their patriarchal chiefs, and are not supposed to be above selling their active services to the Christian.

I was most hospitably entertained at Van by our Vice-Consul, Mr. Lamb, and was well "dined" by Van society, which then consisted of, besides our own Vice-Consul, Consuls for Russia and Persia, the American missionaries and Dominican priests, besides the Turkish authorities and Armenian priests and gentlemen. High-class Turkish cookery is excellent: the local wine good and wholesome.

From Van I passed over into Persian Armenia by the Kotur Pass to visit the plains of Salmas and Urumiah, centres of large Christian communities, both Armenian and Nestorian.

Practically the Kurdistan hills cease at the parallel of latitude tangent to the southern shores of Lake Van, and to its northward an elevated hilly plateau takes their place. From Lake Van to the western summit of the Kotur Pass the country is open. The mountains on the Persian side are formed by the falling away of the Van-Sarai plateau to the level of Lake Urumiah, a fall of something under 3000 feet, and its being cut up into numerous valleys by water action.

Between the plain of Salmas and Bash Kal'a, in the Kurdistan hills, the high, rounded, and undulating hills are crossed almost without a steep gradient. Between Van and Bash Kal'a is a more elevated and hilly district than the above, rising to 9000 feet, easy to traverse in summer,

but difficult during winter, snow lying on an average 3 feet deep. From Van to NE. and SE. the hills are rounded, and continue to be of this character to Nurduz, Shattak, and Meuks, and southward to the Nehil and Zav rivers. Within the quadrilateral formed by the head-waters of the Zav, which rise in Gavar and Shemdina, and unite in the Shirwan, lies the main mass of the Kurdistan hills, broken up into numerous deep valleys, and forming an impassable barrier to caravan traffic from the months of December to June, on account of the depth of the snow that then covers them. During the summer and autumn mules do not experience much difficulty in crossing them.

I made the first attempt to reach Lake Urumiah from Van on the 23d of January; but in the face of a cutting wind, drifting snow, and a temperature of 25° below freezing, I found it impossible to continue the journey so as to survey and gain a knowledge of the topography of the country, for all trace of road being obliterated, the baggage animals continuously fell into deep snow drifts, and one of my fingers was frost-bitten. We returned to Van, and resumed the journey on the 23d of February, when the day temperature averaged 32°.

Traversing a rising plateau diversified by hills of indurated brown clay forming basins and valleys, the western summit of the Kotur pass, elevated 8200 feet, is reached after a journey of 63 miles. A beaten track over the snow enables caravans to cross it, and such a path can be formed either by the tramp of animals or of men. Several snow-drifts had to be charged, individuals of the party taking them one after the other, and each rolling over, and perhaps off, in turn. Yet it is comparatively easy for horsemen, such as Cossacks, to cross this country during mid-winter; a path once beaten remains hard and passable, and cold is nothing but comparative, if properly clad; when the nipping winds of zero have been felt, 20° becomes pleasantly warm, and 30° rather hot than otherwise; one looks with wonder at the long icicles of frozen perspiration hanging from the belly of one's horse, and feels inconvenienced by similar pendants from the moustache, but nothing more, and during the night one's temperature is kept up by stabling with the cows (65° without any fire). Khoi, elevated 3750 feet, reached at 112 miles, is a fine town, situated in an extensive plain, well covered with gardens, vineyards, and cultivation.

The plain of Salmas, distant 26 miles from it, is dotted with villages (sixty), surrounded by vineyards and plantations of fruit-trees, having a population of about 50,000, of whom 3000 are Chaldeans or Catholic Nestorians, 6000 Armenians, and 40,000 are Muslims (Persians). Snow covered the plain, elevated 4750 feet, when visited early in March, and the night minimum sank to 15°. The villages are farmed out, and the villagers taxed both in money and kind at the will of their masters, the owners of the village. The only restraint upon an owner is the knowledge that if his exactions are excessive, the people will rise *en masse* and complain, long and persistently, until the proprietorship of the village is taken away and sold to another. The principle on which the Government act is that no man will destroy his own property. Rule is very lax. The Persians here are said to be polite; merciless to man in times of famine, and to beasts of burden always, although they feed the latter

well; they are deceitful, and hospitable only to gain an end. At Khoi the Wizier presented me with a lamb—a pet white lamb—remarking, "You won't eat it, will you? You will carry it about with you, won't you?" I did not reject his proffered gift without telling him what I thought of him for offering a traveller what he well knew he could not accept. Persia does not deal financially more oppressively with her Christian subjects in this part of her empire than with the Muslims; judicially, no doubt, the Christians do not receive equal justice. The American missions have benefited the Christians to an incalculable degree, yet in the plains of Salmas and Urumiah there was a feeling of uneasiness amongst them, for the Muslims are becoming alive to the work of improvement and progress that is being effected in NW. Persia, through the agency of schools established by the American missionaries, and they fear that advantage may be taken by the Mohammadans of some fortuitous occasion to massacre them. We encouraged them by remarking that they were better off than their fathers, and that their sons would be better off than they themselves.

A low range of hills, easily crossed, separates the plains of Salmas and Urumiah. This latter plain contains 200 villages, about one-half of which are inhabited by Nestorians. The dress of the Nestorian women is ungainly but chaste and warm, and that of the men a flowing robe. Travellers should be careful to wear long coats, as a rule, for they consider short coats, exposing the abdomen, to be indecent. I was asked by my host, an American missionary, to kindly wear one of his overcoats when I attended a Nestorian Church service.

The girls marry early—many under fifteen years. Since the suppression of the Kurdish rising of 1880, under Shaikh Obeidulla, the country has been fairly secure. The Shaikh gained considerable successes, and believed that he could have conquered Persia had the Turks not interfered. Had be been able to discipline and hold together and increase his following by successes he might have done so, as the Persian power is most feeble.

To reach the country of the hill Nestorians it was necessary to retrace my steps to Salmas, and by passing over huge undulations, rising to a height of 8600 feet to gain Bash Kal'a, the head-quarter town of the Hakkiari waliyat. But to lead you into these intricate hills and to describe to you this interesting people is beyond the limits of this paper. There are 50,000 Nestorian and Armenian, and 5000 Chaldean (Catholic) Christians, in the Kurdistan hills. The Nestorians of the plains are not so pushing a race as the Armenians; they are not treacherous, would be faithful if led, and would be also more subject to authority than the Armenians. They are more simple and honest-hearted, and more resemble the Jews. They lean towards the British. The hill Nestorians are amongst the most unruly of the Turkish subjects. Safe in their hills, they pay little or no revenue. They are a warlike race, but cannot hold their own against the Kurds, who outnumber them. As a people they number about 200,000 souls; the Papal Nestorians or Chaldeans number about 30,000. They hold the doctrine of two persons and two natures in Christ.

A few words, before closing these notes, on the Turkish soldiery, as seen by me whilst being massed in strategic centres ready to meet an anticipated war with Russia (1886), will be of interest. Since landing at Sakandarun in October, whilst journeying along the roads that I have described to you, troops were met on the line of march, and in quarters at Diarbekr, Harput, Malatia, Aleppo, Mardin, Jazirah, Bitlis, Van, etc. On the line of march detachments of the Redif, that is, of the reserve, joining the army, were accompanied by no baggage, not even one donkey. The men were poorly clad; some in semi-uniform, some with overcoats, some without; some with arms (Martini-Peabody rifles), some without. In the villages they lodged in the khans, mosques, etc. Free rations of bread and youourt (curds) were supplied by the villagers, and, as well, what bedding could be got together.

In the towns they were closely packed, and lodged in barracks, khans, mosques, etc., without any regard to sanitation; poorly clad, and with scant bedding, generally their constitutions were so good, health so robust, and powers of endurance of such a high nature, that for the first few months, at all events, of life under such insanitary conditions, but few suffered. After some months of such a state of things, sickness was, I heard, considerably on the increase, chiefly typhus.

Of military enthusiasm amongst them there appeared to be next to nothing; indeed, between the head of the Gulf and the line Mardin-Harput it was at a very low ebb. The villagers were dumbfounded at the idea of another campaign, with Russia as a possible foe, and all agreed that they were no match for a first-class Christian Power. Many of the Redif expressed themselves as ready to be made prisoners of war rather than to fight under such helpless conditions as those then existing. Desertions were not many, because it was not politic to desert before war was actually certain. The men were well fed, but received little or no pay. A Turkish soldier, however, expects to be rarely paid; if he is well fed, clothed, and lodged, he is quite content.

The humanity shown by Russia to her prisoners of war has made a lasting impression upon the Turkish soldiers; they contrast the plenty and comfort of their state as prisoners of war with the want, hardship, and neglect which they suffered at the hands of their officers. The officers, although they would like a chance of revenging themselves on their ancient foe, yet saw little hope of making a good resistance unless aided by England. A show of resistance they hoped to make, but they doubted and feared the result. Money, stores, baggage, organisation, equipment, etc., all were wanting to such a degree as to render the army little better than a military mob. This generation must pass away before these impressions are lost. The opinion we formed was that the rough material was excellent, and would be forthcoming—for the Turkish administrative power is sufficiently widespread and searching to enable it to draw together its able-bodied population,—but that it must be placed under British superior officers, and paid from the British Treasury, for some months before it could be considered even to be a force sufficiently good to act in co-operation with British troops, without fear of ill results arising from it, and that it would take many months, under British officers

and instructors, before it could be trusted, under their leading, to separate action with hope of good results. The Turkish officer is gallant, and a good leader, but is uninstructed. At Aleppo joy filled the barracks, it being reported that I had come to command the troops. They would not now—they are stated to have said—think of running away, nor would they pay the fifty liras necessary to obtain release from military service, for, under a British officer, they were certain of good treatment and regular payment. These sayings, of course, greatly incensed Jamil Pasha, the Wali, who reported to Constantinople that he was anxious about my movements, as I have already mentioned. The reports were altogether the fabrication of the soldiers, and serve to show their desire for a British alliance.

My dragoman, who had served with the British in Egypt, both at Tel-el-Kebir and Suakim, never tired of telling of the smartness of the British soldier, nor of enlarging upon his pay, clothing, rations, etc., and the care bestowed upon him by his officers, both in camp and hospital.

The salient frontier of Turkey at Van, instead of being the advantage to her that it would be could it be occupied in force and strengthened by a *place d'armes* in the neighbourhood of Lake Van, is a disadvantage. Military roads are being completed on the Russian side through the Kaucasus from Kars, Erivan, etc., to the Turkish frontier, whose significance is apparent; cavalry can move everywhere freely thence to the line Erzerum, Bitlis, Mush, Erzinghian; it is trained as mounted infantry, and to long-distance marches; even in winter it could raid over the greater part of the area designated.

Were the Russian concentration to be made at all secretly, and her vanguard (under 10,000 men, chiefly cavalry) to operate with rapidity and decision on a pre-arranged plan, it may be expected that the rich waliyat of Van and that of Hakkiari to Bash Kala could be occupied by her in three weeks, and the outlets of all the passes leading through the Armenian Taurus and the Kurdistan mountains seized.

This elevated plateau of Armenia dominates Mesopotamia, Anatolia, and Syria, blocks a possible and important railway route to India in the future, and gives an excellent point of departure whence to reach Smyrna and Constantinople, that unrivalled commercial and strategical centre of the world. We are wrong to think that Constantinople can only be reached by crossing the Balkans. It seems to us that the possession of the eastern shores of the Bosporus and Dardanelles would content Russia for many years, if it would not be of equal value to her as the possession of Constantinople. The value of the commercial and strategic position of Constantinople has only to be seen to be realised.

The Russian view of the situation is that she will be compelled to force progress and justice upon Turkey, as she has ever done, and in default of the action of Great Britain. Every step of progress must be forced on Turkey, for of herself she will do nothing. Should Armenia be absorbed by Russia, the fear of an Armenian question arising has not been lost sight of. Such a question needs as much to be feared as a Kurdish question, *i.e.* the questions of setting up nationalities of

Armenians and Kurds. Russia would probably treat such questions very summarily. Her plan is to Russianize all conquered peoples. To all appearances Britain is absolutely doing nothing of any practical moment in this country to better it, to strengthen it, or to aid it to better itself. Since we became responsible for reform in Asia Minor, a few military consuls, scattered at wide distances, have protected Christians, and done much good in the cause of justice: what good they have done shows what good it is possible to effect, and should but cause us to repent our too early relinquished responsibility, and our neglected opportunities, the mere presence of such men in the country having a most salutary effect: but in what is wanted to develop the resources of the country we have attempted nothing. Turkey will do nothing unless a model be put before her. The American missionaries are doing an excellent work by furnishing the moral model, by opening schools, Protestant churches, etc., and, by the force of example, forcing reform upon the Armenian Church, and by these and other means, such as living exemplary and honourable lives, introducing the elements of a higher civilisation amongst both Turks and Armenians. We have, if local opinion be of value, attempted nothing practical. If we do not what we ought to do here, her Russian neighbour will eventually step in and do it for us.

Remarks by a traveller upon the then (1885-86) apparently anomalous position of British consuls in Turkey in Asia may seem out of place, nevertheless they are given for what they are worth. Consuls or vice-consuls, it was understood, had no power to receive petitions from the people amongst whom they lived, nor was it their duty to inquire into complaints, or to travel about the districts in which they were stationed, and concerning the condition of the people inhabiting which, and their state of civilisation and cultivation, etc., they were supposed to make themselves fully informed. They were looked upon solely as commercial agents, and their powers limited to the Waliyat to which they were posted and acknowledged by the Turks. Travelling expenses were at the cost of the consul, etc. To one who had an idea that Great Britain was specially interested in, and responsible for, reforms in Asia Minor, such restrictions on the powers of consular agents and their intercourse with the people, together with those placed on their free movements, seemed altogether incomprehensible.

The strategic importance of this part of Armenia, the Armenian stronghold both topographically and ethnologically, should not be underestimated. Here might be gradually laid the foundation of the nucleus of an Armenian administration, to develop eventually into an autonomous Christian state, thereby rendering it impossible for Russia to occupy it in the interests of Christianity: an initial Christian buffer-state along the Turkish Asiatic frontier, to be in the future expanded under Christian administration into a principality, by drawing into union with itself the Nestorians, Chaldeans, Syrian Christians, etc., inhabiting the country stretching from Erzerum to Mosul. Armenians, it should be also remembered, are widely scattered throughout Asia Minor, and are numerous in the Waliyats of Erzerum, Van, Harput, and Diarbekr: a powerful body in union, powerless in disunion.

It has been stated recently in the daily papers that many of the

Armenians of Asia Minor had been negotiating with Persia a migration into Persian Armenia, and that the Sultan, rather than ameliorate their unsatisfactory condition, had stated that they might go where they liked. This decision of the Sublime Porte can scarcely be credited, because it would mean a great loss of revenue, and but lead to further discontent amongst those of the $2\frac{1}{4}$ millions of Armenian subjects still remaining within Turkish borders.

There are many sins, and amongst them sins of omission of many sorts —spiritual, moral, political. All are alike neglects leading to decay, degeneration, and death, whether in man or in a nation. We as a nation are great political sinners, and our sins are those of omission and neglect. The defence of an empire may be compared to that of a military position, inasmuch as parts of it must be held by troops, and parts of it denied to the enemy, and these latter are of such importance that the neglect of them must carry with it the wages of sins of omission just enumerated. One of the links in our imperial geographical chain, necessary to its rigidity, and to be denied to an enemy, is Armenia, and we are neglecting her because of the difficulties of aiding her. As a nation we have not as yet awakened to the sense of our danger and responsibilities in the East, and the ways in which they may react upon our prosperity, and that of our colonies, and the necessity of extending our Eastern administration and responsibilities so as to include more fully in their sympathies our neighbours, the nationalities lying between the borders of India and the Mediterranean Sea—and thus to meet the requirements of the advance of years, are not as yet properly understood.

It would be a good thing if some political Jeremiah were to arise to preach to the British people concerning the events that may happen in their day, and which will overwhelm them in their tide if they be not stemmed in time. True it is that commercial enterprise flies the Turkish official, yet we have a precedent to guide us, for no more corrupt officialdom exists than that of China, and the working of the Imperial Chinese Customs department shows what excellent results may arise from a little good administration. Private companies (British or Anglo-German), or, failing these, Imperial British-Turko-Armenian customs and public works departments, under guarantee of absolute ownership of railways, roads, canals, etc., under conceivable conditions, would resuscitate its finance and develop its latent wealth, with an outlay of 50 millions sterling. Without this help Turkey in Asia must continue in the downward course of decay till she rots to pieces and becomes absorbed by others. Is it not time that money be laid out in Turkey and Persia, etc., to be administered by ourselves, and not, as heretofore, by venal pashas, in order to aid them and better ourselves? By the strengthening influence of good administration and public works alone can such a kingdom as Asia Minor be raised by peaceful means in the scale of nations, and it behoves Great Britain to beware how she lays aside the *rôle* she has been elected to play in the world's history, and to count the cost before she does so, bearing in mind that the only other road to progress leads over the dead ashes of man's animal nature, and of the pleasures of an untrammelled life which those who enjoy will only give up by force, if uninfluenced by example; to withdraw

her hand from the task will be to give it over to others as distasteful to her, and her lot will be to die as surely as have died the nations who have before her educated the world, so soon as the desire for peace and quiet, ease and luxury, overruled all other desires, and led to weariness of the task. The degeneration, decay, and death of men and of empires result from the same cause, viz., from a failure to correspond with their environments; in other words, as regards empires, from a failure to actively sympathise with their neighbours. This great Christian nation is, after all, but a selfish people hoarding accumulated wealth, and refusing to spend it on either insurance or philanthropy. The millions of its Eastern neighbours that would benefit by its wealth, if it were but laid out remuneratively in communications necessary to its imperial existence, are not considered. Notwithstanding that every one pound so laid out would produce ten pounds, the nation acts as did the over-cautious servant, and it will receive the same reward. We have not yet learnt our duty to our imperial neighbours, or acknowledged those whose fortunes are bound up with ours by the links of imperial geographical position, and its enforced common interests, to be such. Such links none can unrivet, and they are designed to draw together nationalities, and require of each that self-sacrifice necessary to every bond of union. Hateful neighbours though some of them be, yet we must do the best we can with them, and to this end the unsatisfactory state of affairs in Armenia should receive our attention, for that there is deep-seated dissatisfaction amongst its Christian peoples, and that they are capable of a higher civilisation and destiny than they at present enjoy, or can look forward to, are undoubted truths.

They are Christians whom we can raise to the level of ourselves, and we can say with Shylock, "I will buy with you, sell with you, talk with you, walk with you, and so following"; but we cannot say with him, "I will not eat with you, drink with you, nor pray with you," and we might add, "marry with you": they are one of our Eastern Imperial environments with whom we can fortunately be in complete correspondence. One of the American missionaries to the Nestorians took a bride from the maidens of Tiari, and both Nestorian and Armenian pastors are their fellow-labourers in the same mission field.

## THE WALL OF DERBEND.

*(With a Map.)*

By the Hon. John Abercromby.

In August 1888 I had an opportunity of visiting the Derbend, or Caucasian Wall, as it is also called, which stretches for a distance of 24 or 25 miles inland from the western extremity of the town, and terminates on the summit of a commanding mountain ridge. Though it has never been reckoned among the seven wonders of the world, it is remarkable enough in its way. I believe, too, that little is known of it in this

country. It is so vaguely spoken of in the *Encyclopædia Britannica*,[1] under the article Derbend, that the reader is left uncertain whether there is a wall independent of the town walls, the northern wall of which is called The Great Derbend or Caucasian Wall, also known as Alexander's Wall. The blunder is also committed of placing the Narin Kala, or citadel, on the top of the Jalgan mountain. The statement, too, in Murray's *Handbook*,[2] to the effect "that travellers bound for Baku will have a full view of Derbend, with its renowned walls 20 feet to 40 feet high, stretching straight up the hills among the brushwood," leads one to believe that the walls—more exactly the wall—extend no further than the summit of the Jalgan mountain, at the base of which the town lies, and that they are visible up to that point, which is not the case.

M. Réclus[3] states that to the west of the Narin Kala, or citadel, at the western extremity of the town, the wall, strengthened by large towers, follows the crest of the hills, descends ravines, terminates at a distant peak, and that vestiges of it can be traced for a distance of 30 kilomètres. But the small and inaccurate plan which accompanies the text does not bring the wall any further than Bilgádi, which lies about halfway between its two extremities.

Dr. E. Eichwald,[4] who visited Derbend before the year 1834, visited part of the wall. He mentions (vol. i. p. 129) the villages of Mugatei (Mugátir), Kamach (Kemákh), Sidian (Zadián), and Balchadi (Bilgádi), a distance of 18 versts (12½ miles) from the sea. Beyond this he was unable to pursue his researches owing to the unsafety of travelling at such a comparatively recent period. He remarks that, about one hundred years before his time, in the reign of Peter the Great, Prince Demetrius Cantemir had only been able to follow the wall for 7 versts (5 miles), from the danger attending such an enterprise. At that period the wall was quite visible from the citadel to the top of the mountain, and it had the same height and thickness as the wall of the town. He further quotes Christopher Burrough who travelled between 1579 and 1580, and had remarked a wall extending westwards from the castle towards the interior of the country. He was told it reached to the Black Sea, and had been built by Alexander the Great.

At the close of the last century Jacob Reineggs[5] visited Derbend, and descants on the dangers attending a tour in Tabasaran. There was a great risk of being first captured and then sold as a slave. It was only possible to travel safely when accompanied by a well-known and influential native of the country. His description of the wall is, therefore, somewhat scanty. He states that from the Narin Kala another not less strong single wall runs about a verst to the west over the high and unapproachable mountain. But some of the towers were fallen in, and in places the wall was much injured. There were traces of its being continued further westward.

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[1] 9th edition, 1877.
[2] *Handbook for Russia*, 1875.
[3] *Nouvelle Géographie Universelle*, 1881.
[4] *Periplus des Caspischen Meeres*, 1834.
[5] *Beschreibung des Kaucasus*, edited by Schröder; 1796.

In the year 1637 Adam Olearius[1] visited Derbend on his way to Persia. He saw on the mountain above the town the ruins of a wall 3 feet thick, which extended for more than 50 leagues. In some places it had a height of 6 feet or 7 feet, in others it was not more than 2 feet high, while elsewhere it was entirely levelled. He could see on other hills the remains of several old castles and other buildings which showed they had been built square. Two were entire, with very high walls, and each was occupied by a garrison.

Jakut al Rumi,[2] who began writing his geography at Merv in the year 1218, under the article Bab el Abwab, has collected extracts from various Arab authors relating to Derbend. From one of them we learn that above the town a stone wall stretched over the mountain in the direction of its length. It was impossible to penetrate that way into the Musulman country by reason of the difficult roads and narrow paths which led thither. The wall was constructed by Anushirvan, after an arrangement to that effect with the Kaqān of the Khazars, and terminated at a place where further passage became impossible. It was built of squared stones, the smallest of which was not less than 50 feet high. These were fastened together with iron clasps, soldered with lead, and the wall had a length of 7 parasangs, or nearly 25 miles. It was traversed by seven roads, each commanded by a town in which was placed a Persian garrison.

B. Dorn[3] quotes Ahmed ibn Wadhih el Isbahany to the effect that the wall of Derbend was built by Anushirvan. It had a length of 7 parasangs, and terminated on a steep inaccessible mountain. It was built of quadrangular hewn stones, one of which fifty men could scarcely lift. There were seven passages or exits in the wall, each guarded by a gate. The wall was so wide that twenty riders could ride on it without jostling.

From the *Derbend Nameh*,[4] also a compilation from various Arabic and Persian sources, though written in Turkish, we gather that the wall was built by Anushirvan the Just, better known as Khosroes I., who reigned between A.D. 531 and 579. The work was executed, however, by order of his father, Kobad, who flourished A.D. 491 to 531. For a long time perpetual wars were waged between Kaqān of the Khazars (who had his seat of government on the sea-shore on the banks of the Volga) and Kobad. At last the latter proposed a boundary wall should be built between them. The Kaqān assented to the idea, and suggested that the wall built by Alexander, Lord of the Two Horns, should be taken as the boundary, and that the Persians should build a town there. The Persian nobles deputed to superintend the building of the city found that Alexander's Wall jutted a whole parasang into the Caspian, and extended westwards to the Black Sea. They built the town in seven months, and called it Bab ul Abwab Derbend. But further on we are

[1] *Voyages faits en Moscovie, Tartarie, et Perse*; Amsterdam, 1727.

[2] *Yákût ál Rumi, Diction. de la Perse*; Barbier de Meynard, 1861.

[3] *Mélanges asiatique*; Bull. de l'Acad. Imp. des Sciences de St. Pétersbourg, tome vi., 1871.

[4] Transl. with Notes, by Mirza A. Kazem Beg; St. Petersburg, 1851.

told that Anushirvan, by order of his father, built in the neighbourhood of Derbend sixty-three (var. 360) towns and fortresses. He also erected a wall at a distance of 3 parasangs from Derbend, which extended to a distance of 92 parasangs. Another author states that Anushirvan renewed the wall of Alexander, and erected 360 buildings or fortifications at the various passages. In another version of the *Derbend Nameh*, translated by Klaproth, it mentions that Kobad first built a wall on the foundations of that of Alexander, the position of which was pointed out to him by the Angel Gabriel, and then another to the south of it. These must be the north and south walls of the town, the northern one being still attributed to Alexander the Great. Then he began another wall from the sea to the extreme limit of Tabasaran, a distance from Derbend of 90 agach, or about 315 miles. He placed iron gates where necessary, and completed the wall in seven years.

Several villages either on or quite close to the wall are mentioned in the history of Derbend, as recorded in the *Derbend Nameh*. In A.H. 41 (A.D. 663) the shallow valley in which Darvag lies was the scene of a sanguinary engagement, lasting for five days, between the Khazars and the Arabs. In A.H. 103 (A.D. 725) the Arabs plundered Yersi (Ersi), Duvek (Dübek), Zeil (Zil), Darvag, Humeidi (Geméidi) and Kemakh. In A.H. 136 (A.D. 758) Yezid was sent by the Khalif to Derbend. He rebuilt Suwār (Zavar (?)), Meta'a (Metági), Kimikh (Kemákh), Darvag, Yersi, and Humaidy (Geméidi), and settled men of Hams (Emesa) in Humeidi, and men of Damascus in Darvag. Further, he repaired Meqater (Mugátir) and Ma'raqa. Two other fortified places on or near the wall, which have not been identified, are Simnan (var. Sifnān, var. Signan), which the Turkish writer knew in his day as Tchirki, and Dughrini.

It is evident there is a good deal of error in some of these brief notices. As Alexander the Great was never near Derbend, the wall he is supposed to have built from the Caspian to the Black Sea can only be regarded as fabulous. And the ruins of the actual wall must be attributed to Anushirvan, also known as Khosroes I. with the object of checking the incursions into Persian territory of the Khazars from the north. The date of its construction may accordingly be placed with certainty in the early part of the sixth century. Perhaps the most accurate fact concerning the wall is the length of 7 parasangs given it by El Isbahany, which is very exact.

I have not attempted to exhaust all previous notices of the wall of Derbend, but have merely desired to show who built it, and how meagre are the accounts given us by some of those who have visited Derbend within the last three hundred years. The most recent author who has published an account of it is General v. Erckert,[1] to whose work I shall occasionally refer in the course of my description. Indeed, it was from a hasty glance at his book which I found in the house of the Russian governor of Botlikh, in the Avar country, that I first learnt of the existence of the wall, and immediately made up my mind to explore it myself. Though I knew before that the walls of Derbend were famous,

[1] *Der Kaukasus u. seine Völker*: Leipzig, 1888.

and that inscriptions had been found on them, I always believed that the walls of the town were alone intended.

The town of Derbend is situated partly on the level shore, partly on the slope of the Jalgan mountain. It is, or rather was, enclosed by walls, and had the form of an elongated parallelogram. The north and south walls, strengthened by small square towers at intervals, were about a mile and a half long and nearly parallel. At the west, or more correctly south-west, end of the town lies the Narin Kala or citadel, of irregular outline, also strengthened by flanking towers. At their eastern or lower end the interval between the north and south wall is about 400 yards. Below the citadel the north wall forms an obtuse salient angle, where the width between it and the south wall is greatest. At present the whole of the short east wall has been demolished, and considerable portions of the south wall.

The Jalgan mountain, for the most part covered with dense evergreen scrub, is about six miles long, and runs nearly parallel to the sea-shore. Its highest point is 2357 ft. above the sea-level, and its crest forms an indented ridge falling precipitously to the west, but with a more gradual slope towards the east. From the sea to the highest point as the crow flies is rather more than three miles and a half, and the average slope of the eastern face is about one in seven or one in eight.

The walls of the town are about 13 ft. thick. The front and rear face of each wall consists of a casing of thick rectangular slabs of yellow calcareous stone, measuring about $4\frac{1}{2}$ ft. by 5 ft., with an internal stuffing of rubble, the whole firmly cemented together with excellent lime. The slabs are laid alternately lengthways and end-on, like the headers and stretchers of a brick wall. It must be evident that such a construction gives unusual strength to the casing, as the long faces of alternate slabs are imbedded four or five feet deep in rubble. The walls were once crowned with a battlement with step-shaped finials of Persian type, but only a small portion now remains. The masonry of the town walls, apart of course from later repairs, corresponds with that of two score and upwards of rectangular forts along the wall west of the citadel, which shows they belong to one epoch.

A steep and deep ravine on the western and northern sides of the Narin Kala greatly augments its natural strength, and in ancient times it must have been well-nigh impregnable. I was unable to see any trace of the wall from any corner of the citadel up the face of the mountain to Premeshki Kala, and the guide knew of none. But it undoubtedly exists, for General v. Erckert observed it, and has marked it on his plan. The ground is rough and much broken besides, being covered with thick bushes, so that traces of the foundations might easily escape the notice of any one who did not know where to look. The direct distance from Narin Kala to Premeskhi Kala on the crest of the ridge is 3 versts, but the narrow track leading to it is fully 3 miles long. Near the summit the underwood becomes inpenetrable except along the paths cut through it.

Premeshki Kala, which is perhaps is a corruption of Pir Dimishek,

"the Saint of Damascus,"[1] lies in a cup-shaped depression on the crest of the Jalgan mountain, almost in a line with the prolongation of the long town walls, and is commonly known as Burj or The Tower. It is rather difficult to take stock of from the density of the surrounding scrub. In plan it is oblong, about 38 paces by 30, with an entrance in the rear or eastern face and a semi-circular tower at each angle. The upper part of the structure is in ruins. The ground in front falls very abruptly and from the top of the walls a good view of the country can be obtained.

Chorógli Kala,[2] "the castle of the blind man's son," lies a verst to the south, on the highest point of the Jalgan mountain. It is in a very dilapidated condition, but there is enough to show it does not differ in plan from the last fort. As I did not follow the ground between the two forts, I do not know if traces of a connecting wall exist, though it would hardly be necessary from the precipitous nature of the western face of the mountain. A good bird's-eye view of the wall as far as Kejíli, up to which point it is fairly well preserved, presents itself from this spot.

Three or four hundred feet below Chorógli Kala, between the heads of two valleys, runs a neck of land in a south-westerly direction, along which the wall is continued. Without a plan on a large scale it is impossible to show all the ins and outs of the wall as far as Kejíli, a distance of about $2\frac{1}{2}$ miles, or to state the exact distance between the forts. Not having expected to do any surveying when I left home, I was entirely without instruments of any kind except a small pocket compass. In the plan which accompanies this paper the position of the forts is therefore very approximate, except where fixed points could be obtained from the five-verst map. I heard on the spot that General Komaroff, who is known to be interested in archæology, had surveyed and made a plan of the wall in its entire length, but I am not aware that it has been published.

Following the traces of the wall, which is a good deal broken down here for about a verst, we reached the ruined fort of Sular, "Waters," and a little further on that of Isti Sular, "Hot waters," or Bari Meshashi, "the Castle-wall of the Forest," which is entirely surrounded and overgrown inside with thick bushes. Here the line-wall is connected with the rear face of the fort. Beyond is another fort also called Ishti Sular by the guide, and further on we came to Shur-su, "Brackish water." He was not sure of the names of these four keeps, but said the district they were in bore the designations I have given. Here the connecting wall on both sides of the fort meets it at the inner shoulders of the two front semi-circular towers, but is not bonded into its masonry. From this it is evident the forts were built first, and the wall between them afterwards. About 300 yards further on, in a south-westerly direction, there is a well-preserved oblong, though apparently nameless, fort, with semi-circular towers at the angles, and with a solid buttress of oblong plan projecting from the rear face. The connecting wall on either side

[1] He is mentioned in the *Derbend Namch.*

[2] Korogli Kaleh, according to von Erckert.

meets it at the centre of its two shorter sides, and is not bonded into it. Kejíli lies, roughly,[1] S. 45 W., and Premeshki K., N. 50 E. The wall continues in a direction a little south of west for some distance to a semicircular tower engaged in it. About 100 yards ahead, in a southerly direction, are the ruins of a fort only known as Burj, where the wall turns at right angles nearly due west, and very shortly afterwards bends at right angles to the left, and follows a course nearly north and south for about 300 yards. The centre of this wall is flanked by a small round tower with a chamber below it. Here the connecting wall is about 20 feet high, and though I could not measure its thickness it seemed to be less than that of the town walls. All the way from Sular to this point the wall is much better preserved than elsewhere, and rises to a height varying from about 8 feet to 20 feet. Following on a little further, and also ascending, we reached the damaged fort of Kejíli, of which portions of the four walls remain.

Except just at the neck of land below Chorógli K., the whole of the ridge along which the wall runs is very densely beset with nearly impenetrable evergreen bushes which obscure the wall, and render it very difficult of access. I was also unfortunately prevented by circumstances from visiting any part of the wall both going and coming, and therefore only saw portions of either the front or rear, but never of both faces.

The two long faces of Kejíli (or *Kejáli*) K. have a direction N. 30 W. Premeshki lies, roughly, N. 50 E., and Metági N. 73 W. The distance to the Tāt village of Metági along the crest of a ridge is about a mile and a half, and traces of the wall can be seen among the brushwood. There is no fort at Metági, but vestiges of the wall continue visible along the ridge in a north-westerly direction to the village of Kemákh, a distance of about $2\frac{1}{2}$ miles. The fort of Kemákh is oblong, and differs from the others in having angular towers at its four corners, though they do not project more than a couple of feet. It occupies a very commanding position, and forms a prominent landmark far and wide. The villagers said there was no fort between them and Metági, and that only slight traces of the wall existed in the direction of the village of Zadián.

From Kemákh the wall must have swept gradually round to the left along the crest of the ridge—I did not follow it exactly—to Zavar K., now a complete ruin, though enough remains to show it had round towers at the angles. Metági bears S. 50 E. Duzlan K. was formerly in the village of Zadián, but is now quite demolished. From its site Kemákh K. bears S. 70 E. Both here and at Zavar K. the forts seem to have been almost within the connecting wall, and were not therefore used as flanking towers. A gate is said to have stood here formerly, and my guide spoke of a Vidi K., now quite destroyed, as having formerly stood somewhere near the village. Vestiges of the wall can be traced on the west side of Duzlan K. in a direction N. 35 W., but after about 100 yards it turns nearly at right angles to the left, and swings round in that direction towards Bilgádi. At this place the wall crossed a narrow

[1] The compass-bearings are magnetic and uncorrected.

ravine. On the left side of this are the remains of a doorway which was closed within the memory of my informant by an iron door. In fact, in his opinion, Bilgádi is a corruption of the Arabic Bab il Hadid, "The Iron Gate," and he stated moreover that a town formerly stood here. To the right front of the doorway rises an isolated rock on which buildings formerly stood. It is known as Sar Kala, "Head Castle." The distance from the citadel of Derbend is about 11 miles.

A ride in a general south-westerly direction over a rough wooded country, during which I lost all trace of the wall, brought us to Tel Hammadan K.,[1] from which the walls of Shalkene K. could be seen bearing S. 12 W. The surrounding wood made it impossible to obtain a good view in any direction, but a short ride led us to Mehmet Kärim K., also known as Shalkene K. It is in fairly good preservation, has an interior length of 32 paces, and a breadth of 22 paces, with semi-circular towers at the angles. The ground in front falls very abruptly, and also rises behind it as the fort is not situated exactly on the crest of the hill. I could find no trace of the wall either on the right or left flank, and no mark of it against the masonry of the fort itself. A little further on, in a southerly direction, stands another Shalkene K., with round towers engaged in the four angles, having a length of 35 paces and a breadth of 41 paces. In the direction of its length it lies due north and south (magnetic).

Some distance beyond lies the hamlet of Geméidi, where there are the sites of two forts now razed to the ground. They stand close together on the edge of a ridge, and, as a path runs up the small hollow between them, it is possible a gateway once stood here. The front of these forts was turned to the north, and the low ground in that direction is open, though the higher ground in rear and the steep slopes to the right, on which lie the Shalkene forts, are densely timbered. Shalkene K. bears N. 20 E., and Kemákh N. 60 E.

Between the villages of Geméidi and Darvag a distance of about $2\frac{1}{4}$ miles, there are seven forts, the general direction of the first five being N. 70 W.

Pataiyúng K., like all the other forts, is more or less ruined, has semi-circular towers at the angles, and is surrounded by trees and bushes. The guides averred there was no trace of a wall between it and Geméidi, though I noticed vestiges of it running east and west from the north side of the fort. A little further on, near the bottom of a ravine, lies Noruz 'Ali K., the front face of which lies N. 75 W. The eastern face is entirely demolished, and the ground falls steeply to the front. In another ravine beyond lies Hassan Bey K., with the usual semi-circular towers at the angles. About 100 yards further on the other side of the ravine is situated Babanu K. It is entered by a doorway between two projecting buttresses of masonry on the south-west or rear face of the fort. On some of the stones near the ground there are Kufic inscriptions. Inside and high up in the left-hand corner of the front wall there is a deeply cut representation of a wild goat or some such animal, with long

[1] I think forts 14, 15, 16 on the plan should all be shifted about a verst to the north.

curved horns.[1] On the outside of the rear wall there is a line of inscription in a character which I could not recognise. About 250 yards to the west, on the top of a hill so densely wooded that we had to dismount, stands Palangi K., "Leopard's Castle," also known as Sezhür Kala. There was no perceptible ingress save through the broken-down north-east angle of the building. From this point the wall must have changed direction to the south, though the country is so wooded that I could see nothing in any direction till we arrived at the much ruined fort of Mughara K. It lies on the edge of a ridge overlooking the village and valley of Darvag. On a small eminence in the centre of the village, towards which we had to descend, stands Beglar K., "The Castle of the Princes," now very much damaged. General v. Erckert mentions that at Darvag the wall is double for a certain distance, and encloses a wide area, but this fact escaped my notice.

Between the villages of Darvag and Zil, a distance of about 3 miles, there are eight forts. Dervish Kala lies about a couple of versts to the south-west of the former, enveloped in brushwood and trees. It is in tolerably good preservation, and has the usual round towers at the corners. Its front face lies N. 60 E. Not far off lies Kŏbi Kala, so closely beset by trees that nothing can be seen in any direction. The doorway is in the south wall. There are two loopholes in the east wall and two or more in the other faces of the fort.

The front face of Ishekhli-su Kala, "Clear-water Castle," bears N. 30 W. The walls are loopholed, and on the outside lay a portion of a battlement. This was a single slab with three steps cut on each side and a horseshoe terminal at the top, on the outside face of which a rosette ornament was introduced within a horseshoe frame. At the south-west corner a portion of the connecting wall is visible having a direction S. 40 W., but its masonry is not bonded into that of the fort.

Makhragakh Kala is greatly ruined. About 250 yards S. 60 W., on the other side of a ravine trending north-west, lies Akhái Kala, also much destroyed, and situated in such dense cover that no bearings could be taken; but Zil was indicated by the guide's forefinger as lying to the south-west. According to him a wall ran from the end of the face fronting Zil to connect this fort with those to the west. In proceeding through the woods to Oghri Kala, "Thief's Castle," we crossed a narrow piece of wall trending S. 60 W., which the guide said formerly connected Akhái Kala with Bashim Dishim Kala, and could be traced as far as Ürnürg Kala, beyond Zil.

Oghri Kala lies in a dense wood, and is in fair preservation. Zil lies N. 70 W., Darvag N. 40 E., and Chukhná Kala, where the wall terminates, S. 76 W. On lower ground, and not far off, lies Bashim Dishim Kala, "My head and my tooth castle." The four walls are still standing, with a few loopholes at irregular intervals, and the usual semi-circular towers at the angles. From the density of the surrounding foliage no bearings were possible. About 100 yards or so to the west stands Chipsokhón Kala, now in a very ruined condition, and considerably below the

[1] Figured in *A Trip through the Eastern Caucasus*, 1889, by the author of this paper.

crest of the ridge on which the village of Zil is situated about half a mile further on.

Between Zil and Chukhná Kala, a distance of over 5½ miles, there are twelve forts.

About a verst from Zil in a north-westerly direction stands the much damaged Urnürg Kala. A short distance beyond, on more elevated ground, are the ruins of Abdullah Beg Kala. It takes its name from a celebrated local brigand, who stood a siege there; hence its dilapidated condition. The front face lies S. 30 E. Not far off is Ramazan Kala, of which only one wall is left standing. Kemákh lies N. 70 E.

Kadách Kala occupies a commanding position on elevated ground, from which Chukhná Kala can be seen to the south-west, and Kemákh Kala to the north-east by east. Beyond this in a westerly direction lies Mothi Kala, of which very little remains. Mirza Kala is also much ruined. The ground to the north and north-west falls away abruptly, and the fort seems to occupy the north-west angle of the range of hills on which Zil stands.[1]

Akhmé Kala lies a short distance to the south-west, is much destroyed, and so surrounded by trees that nothing could be seen from it. Still further in the same direction lies the much-ruined Nevrüz Kala, or Nevrüz Kala, "Castle of the new day or vernal equinox." It is wholly environed by wood, shutting out the view in every quarter, but the guide pointed south when I inquired where Tatil lay. Of Emizgyá Kala little is left but the foundations, and its position is so buried in foliage that I could take no bearings. It seems to lie on a narrow ridge, as a few yards to the south I could see the valley of the Rubas Chai. The guide pointed east to give the direction of the last fort.

Hardly anything remains of Kharar'il Kala, and it is so entirely surrounded by large trees that the view is everywhere obstructed, but the ground falls away steeply to the north-east. I could only very roughly ascertain the position of the next fort of Zeidakh Tular Kala by taking a bearing in the direction of the guide's extended arm, which gave S. 60 W. This fort lies at the end of a high projecting point of ground covered with trees, where the ground falls in three directions. The walls are much damaged. Chukná Kala lies S. 53 W., and is separated by a wide open depression which flattens out to the right (north-west), and falls abruptly to the left, where it helps to form the western side of the Rubas Chai valley. The village of Dübek bears N. 14 W. About 300 yards lower down lies Himlarik Kala, of which very little now remains, surrounded by trees and brushwood. Zeidar Tular Kala bears N. 60 E. The guide had never heard of a wall connecting these forts, and I could see no trace of one. In the direction of Chukhná Kala he maintained there were no more forts. Though I visited that place, I made the ascent from the south-east through the village of Yakhdikh, and so could not control his statement.

[1] If this is really so, fort 39 on the plan should be placed where fort 40 is put. I also think that forts 44, 45 might be set about half a verst nearer 46, as 45 would then agree with the position of a fort laid down on the five-verst map, which I thought at one time I had not visited.

Chukhná Kala lies on the summit of the Kara Sirt, "black ridge or peak," an elevated ridge trending north-west and south-east, which is cut through by the Rubas River about a mile and three-quarters, as the crow flies, to the south-east of the fort. From the river to the top is a continuous and very steep ascent, for the Kara Sirt dominates all the country east of it, though the five-verst map does not give its elevation in feet. It was unfortunately nearly dark, the sky was overcast, and the rain falling in torrents when I made my visit, so that I could not take a satisfactory survey of the place. The fort is a good deal ruined, and overgrown with brushwood. It is entered by a horse-shoe archway facing N. 60 E., which gives a line on Kemákh. The walls have flanking towers, and are likewise loopholed. The ground seemed to fall very abruptly to the south-west. In full daylight there must be an extensive view, embracing the whole line of wall from the Jalgan mountain on the right to an equal distance on the left. General v. Erckert calls this fort Chukhun Kaleh, and explains it by "Jews' Castle," which I think is very doubtful. He says it fronts the west, measures 80 paces by 40, that the walls are over 2 mètres thick and 14 mètres high.

In conclusion, I will only add that, though the description I have given of the Wall of Derbend is necessarily very imperfect, I hope I have smoothed the way for future tourists. For I did not visit the forts in the order I have just given, but piecemeal, and often in reverse order, just as I happened to hear of them. There may still be others to catalogue. I am also not sure that I have always given the names correctly, as I am ignorant of the Persian, Turkish, and Arabic languages, which have all helped to furnish designations for the various forts.

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## THE STATE OF THE ACTIVE SICILIAN VOLCANOES IN SEPTEMBER 1889.

By H. J. Johnston-Lavis, M.D., M.R.C.S., B.Sc., F.G.S., etc.

*Honorary Corresponding Member, R. S. G. S.*

As director of the recent excursion of English geologists to the South Italian volcanoes, I had the opportunity of again visiting those of the Lipari Islands and Etna. As I consider it the duty of every scientific observer to record his observations on such interesting, varying, and somewhat neglected igneous vents, the following notes are offered for publication: — We visited Stromboli on Thursday, September 19th, favoured by splendid weather. As is generally known, the active vent of this volcano is situated more than a hundred mètres below and to the north-west of the highest central point of the island, but which latter is not quite the summit of the mountain. The top of the volcano is occupied by the remnants of a crater, probably formed when the present active vent burst out, constituting, as it were, a lateral disruption and permanent parasitic cone on the less resistant side of the mountain. The north-west is the weaker mountain flank, because the sea is deepest at this foot, and lava could never collect in the shallows as it has done

to the west, so that it was constantly undercut by the sea until the amount of material removed was such as to leave the old central axial chimney insufficient support on that side, and hence the result was a lateral eruption in that direction. The greater weakness of the mountain and presence of former eccentric eruptions from this side are proved by the number of solid, and, above all, hollow dykes along this slope of the island. The constant ejections, for the most part falling on this flank of the volcano, tend to repair and thicken it; but it is not only necessary to add so much material to the mountain side above water, but for nearly as much below. The slope, of which the Sciarra represent that portion above sea-level, extends for nearly as much again beneath the marine surface; and as the principal part of the ejectamenta are fragmentary, or soon become so, they roll down the slope, first in the air and then in the water. At sea-level a small stair or terrace exists at the bottom of the Sciarra, due to the undercutting of the waves, in consequence of which, even when the volcano is very quiet, the loose materials are always rolling down from above, owing to constant removal of those beneath which before afforded support, as was the case when I visited Stromboli in June of 1887. Although the ejections were few, and I was able to land on this little beach, a very rare occurrence, yet constant attention was necessary to avoid the stones continually rolling down.

The result of all this is that we have a continuous slope, for the greater part composed of loose materials, nearly 700 mètres or 2000 feet in height, in which the inclination is represented by the maximum angle of repose of these materials. A talus of this height is of rare occurrence.

To return, then, to the central and nearly highest point of the island which we had gained, and from which we saw, some 150 mètres beneath and 100 mètres distant, a group of five active vents. They were hardly cones of eruption, or even craters, but more nearly approaching the former, for the ejection of one destroyed the form of the other. These were all rather small, but varying in size. They were giving off puffs of steam, which formed a number of beautiful vortex-rings, and every now and then would come an ejection of a shower of hot pasty lava cakes, such as are so constantly seen at Vesuvius. The majority of these fall upon the Sciarra, and roll down part or the whole of the 700 mètres, plunge into the sea, and continue their course down the slope beneath the water. Here I obtained a very fair instantaneous photograph, considering the amount of vapour.

Descending along the south-west spur of this ridge, we reached a small plain, from which a good profile view may be had of the craters. Here I again obtained some fairly good photographs, both during and between the explosions. What was of great interest was the oozing forth of lava a short distance beneath one of the more western vents, and on reaching the surface breaking off in pieces, which rolled down the Sciarra.

Stromboli is far more active at present than on 1st June 1887, when I visited it; but during the interval there have been eruptions of considerable violence so as to verge on a paroxysmal type. The deposits visible on the flanks of Stromboli indicate that the volcano has never

approached a true explosive eruption such as must have occurred at Filicuri and Salina.

Vulcano, which burst forth in a feeble explosive eruption on August 3, 1888,[1] has continued with considerable violence ever since to eject the masses of pumice, with an obsidian cortex showing bread-crust structure, together with pieces of ancient rocks, sand, and dust.[2]

Although these so-called bombs are not projected such a great distance, still on our first visit to the island we met with one of about one cubic mètre in volume, and nearly one kilomètre from the crater. It was still quite hot, and could not have been ejected many hours before our arrival.

Thousands of smaller ones were scattered around the cone, and many terminated a line of pits, where they had ricochetted along the ground, excavating the volcanic sand and dust in their path. Some had, on their fall, broken into innumerable fragments, whilst others had buried themselves deeply in the sand and dust.

When we ascended to the north-west lip of the active crater, we found that cavity with the following dimensions :—250 mètres in diameter, and certainly not more than 30 to 40 mètres in depth below the lowest or north-west lip. The inner, as well as the outer slopes, were covered by sand, derived principally from the trituration of obsidian and pumice, intermixed with "bread-crust bombs" of all sizes. In the bottom of the crater were a number of conical depressions in the sand, from which no visible vapour escaped between the explosions, and an unforewarned traveller might have walked across the treacherous surface. From every five minutes to a quarter or half an hour, suddenly an explosion would occur. The whole or part of the crater bottom would be raised in a vast cloud by the escaping vapour and bombs, rising as a splendid murky grey smoke column to a height of 2500 mètres or 8000 feet, and spreading the dust far away over the island and sea. Some would fall back in the crater with many of the larger stones, to be broken and triturated till sufficiently fine to be carried away by the wind. We were able to remain and study some twelve or fifteen of these explosions, and I obtained some splendid instantaneous photos of them in different stages, and I believe other members of the party were equally successful. We were finally driven away by a very violent explosion, during which we were lost for some minutes, and answered to a roll-call afterwards.

My friend Mr. Hobson, who visited Vulcano on April 9, 1889, noticed explosions from three to seven or ten minutes, the larger stones reaching the height of the cone.

What will really take place subsequently at Vulcano it is difficult to determine—whether, for instance, a great mass of obsidian is gradually rising in the crater until it overflows its edge, similar to the stream that has at some time flowed down the north-north-west flank of the cone, forming, as it were, an apron ; or whether the crater will gradually fill, and the cone be completed by the growth of an inner cone of eruption,

[1] Johnston-Lavis, "The Islands of Vulcano and Stromboli," *Nature*, vol. xxxviii. p. 13, and *Brit. Assoc. Reports*, 1888.

[2] Johnston-Lavis, "Further Notes on the Late Eruption at Vulcano Island," *Nature*, xxxix. p. 109.

—are questions that careful continuous observations and time alone can answer.

One fact that has a most interesting bearing upon this is the peculiar accidents that have happened to the telegraphic cable between the town of Lipari and Capo Melazzo, in Sicily; and, looking at the map, it will be seen that it passes at no great distance from Vulcano. The cable, I believe, was laid in 1887. During the night of 21-22 November 1888, at a distance of 5·466 knots from Lipari (the distance from Vulcano is not mentioned), a rupture occurred, and much of the cable was buried beneath stones and mud. This was repaired.

The second interruption happened on March 30, 1889, at the same distance from Lipari. There was no actual break of the cable, but the central conducting wire (as Mr. Astor states) was without doubt interrupted in the interior, and the insulating covering of gutta-percha was softened. While fishing up the cable they broke the lifting hawser, composed of steel wire covered with jute, and capable of resisting a far greater strain than what was put upon it, quite an unknown accident. The jute covering was found totally (*consumata*) eroded, the steel wires being exposed. Also of great importance was the fact that the depth at this spot was found to have diminished 82 mètres.

The third interruption happened just before our arrival, and during our stay at Lipari was repaired. It occurred on September 11, 1889, and the cable was found crushed at various points, and at one spot completely broken, but a little nearer to Lipari on this occasion.[1] These facts, taken together with the coincidence that about the time of the first breakage the sea was observed by fishermen to be "boiling"! and more than the usual amount of pumice floating about would seem to indicate that we have here another eruptive vent at the sea bottom.[2] This eruption is most probably either a submarine outflow of lava or a very active fumarole such as La Caldaja, between the islands of Bottaro and Lisca Bianca. That it was not an explosive eruption is proved by the fact that the phenomena at the surface would have been of a much more violent character had such been the case. The presence of more than the usual amount of floating pumice might be explained by the reheating of old pumice, which had become waterlogged and had sunk to the bottom.

The fact of a submarine eruption occurring so near to the very extensive collection of volcanoes composing the Lipari region is nothing more than we should expect. In fact, the celebrated Graham's Island that appeared and disappeared in 1831 is but a modern example, occurring also on the coast of Sicily, but in the volcanic region of Pantelleria. What, however, is of deep interest is its outbreak, if such it were, after Vulcano had been in eruption for some time, and whilst Stromboli was more than usually active. On the other hand, it must be mentioned, we found Etna in a state of great inactivity.

Arriving in Sicily from Lipari, we first examined the Val del

[1] On my return passage through Messina I had no time to obtain the above information, and my friends, Messrs. Platania, were kind enough to collect it and forward it to me.

[2] Johnston-Lavis, "The Recent Eruption at Vulcano," *Nature*, vol. xxxix. p. 273, 1888.

Bove[1] and other points of interest on the flanks of the giant volcano of Europe. We made the ascent of Etna on Saturday, September 28th. Leaving Biancavilla, where we had slept, between 5 and 6 A.M., we arrived at the Observatory about 5 P.M. It was intended that the party should make the ascent on the following morning, with our director, Professor O. Silvestri, of Catania. Knowing the uncertainty of the weather from hour to hour at these great altitudes, especially near active craters, I called together a few of the younger members of the party, who were not quite exhausted by a ten hours of mules' back, to follow me.

It was just seven years to the day that I had last visited the crater of Etna, since which the central cone had been modified by the effects of the lateral eruptions of 1883 and 1886, so that the paths had been entirely changed. Picking out our way, we were able to ascend with ease on the west flank of the cone, circle about half the crater edge to the south, and descend facing the Observatory.

Although rather late in the evening, and exposed to a perilous wind, we were able to see the interior of the crater very well. On my visit in 1882 the bottom was occupied by two active eruptive cones constantly ejecting scoria cakes; now the crater has increased somewhat in size, the sides have become almost perpendicular, and in some places the edge overhangs the floor, which I should place at about one to two hundred mètres beneath the summit. To the south-east the crater rim is lower and flatter, and forms a slight promontory projecting into the crater, from which we obtained a safer if not a better view, as most of the crater edge was in a most insecure crumbling condition.

From this point then one found the crater bottom to be comparatively flat, so that the cavity may be considered not so much inverted-cone-shaped as of the form of a short cylinder. Innumerable fumaroles covered the sides and bottom, decomposing the rocks into yellow and white substances, principally silica, alumina, chlorides of iron, and alkalies with alums. There appeared to be no principal fumarole, the escape of vapour apparently filtering through in all directions, the loose materials choking the chimney. In a few words, the crater was in a truly solfataric state, and almost exactly like that of Vulcano in June 1887, but of course on a far grander scale. Unfortunately the weather the following morning was so very unfavourable that the rest of the party were unable to make their visit to the crater.

A description of the state of Vesuvius, which I keep constantly under observation, will be left to a more fitting occasion. I would impress upon any one, if even not a geologist, the great interest and beauty of these active European volcanoes, which will repay a visit; but I hold him in duty bound to publicly record the state in which he found them.

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[1] The absence or supposed absence of pumice on the slopes of Etna, I take to indicate that the Val del Bove is not a crater of explosion. The only other explanation I can offer is that it is due to an enormous lateral eruption, the mountain side crumbling in over the fissure and forming a baranco. (May not pumice or its decomposition products be found one of these days?)

## THE KIRGHIS AND KARA-KIRGHIS.[1]

In pushing their conquests into the heart of the great Asiatic continent, the Russians not only civilise the people they come in contact with, but contribute greatly to the progress of geographical knowledge. The book, the title of which is given above, and which was presented at the recent Geographical Congress in Paris, by General Venukoff (*Scot. Geogr. Magazine*, Oct. 1889, p. 552), serves as a good example of the work done in this direction. The government of such a people as the Kirghis cannot, of course, be conducted on the same principles as that of the Russians: it must conform to their habits, traditions, and peculiar conceptions of their civic duties. Hence the necessity of studying such habits, and of bringing to light such traditions and conceptions. This task is frequently undertaken by the Russian administrators themselves, with the aid of specialists placed at their disposal. In the case before us it is General Grodekoff, military governor of the large province of the Syr-Daria, and the well-known hero of Geok-Tepe, who, availing himself of previous studies on the subject, and in particular of the services of Mr. Vyshnegorsky, who has made himself familiar with the language and the habits of Kirghis, has made from the testimony of Kirghis and Kara-kirghis, a remarkable collection of facts concerning their family and civic duties, penal system, and judicial code in general. This work, which purposes to give a complete picture of Kirghis life, is not yet completed; we have before us only the first bulky volume, but the materials for the two remaining ones are ready for the press.

The Kirghis are a very remarkable nomadic people of mixed Mongol-Turkish race. They were very powerful once—the terrible Jenghis-Khan was of the tribe—though now reduced in numbers. They have lost their political independence, but their customs, called in their language *zang* (*adat* in Arabic), have the greater value for ethnologists, in that they have been preserved almost unchanged from a very remote antiquity, and that the Kirghis continue now as in prehistoric times to lead the same patriarchal life of herdsmen, which was also the condition of our own ancestors. The Kirghis are the most conservative people in the world; they have always been governed by unwritten, and for that reason the more stable, traditions; and only recently, by the introduction of the Koran and some of the Russian laws, have their ancient customs undergone certain modifications, or fallen into oblivion. As long as the Kirghis preserve their pastoral mode of life, this change in manners cannot be profound; but as under Russian influence they are beginning to settle down as agriculturists and tradesmen, and as the process will presumably advance at an ever-increasing rate, involving a very great change in their primitive manners, we feel particularly grateful to Gen. Grodekoff for bringing out his work in time, before this change renders the study of those primitive customs far more difficult.

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[1] *Kirghis and Kara-kirghis, in the Province of the Syr-Daria.* By N. J. Grodekoff. Vol. i.: with a map and twelve engravings.

In the volume before us the following subjects are treated :—The origin of the Kirghis and Kara-kirghis, according to their traditions, their tribal divisions, the rights of seniority and precedence, the constitution of the family, the authority of parents and tribal chiefs, the position of women, majority, adoption, tutelage, inheritance, marriage, and divorce ; the customs connected with birth and baptismal rites, the position of children born out of wedlock. Subsequently are given the laws and regulations about the usufruct of water and soil, migration, hospitality, works of charity, goods in common, hiring, donations, commerce, banking, things lost and found, the customary price of animals, and transport by camels. Further on are discussed the penal code, the repression of crime, arbitration, oaths, damages, fines, corporal punishments, the status of judges, the proceedings of the popular tribunals, degradation, banishment, ransoms. Lastly, we find particulars about the *sujuntchi* (a recompence paid for information), betting, the position of the clergy, schools, amusements, the mode of burial, the care of the poor. At the end of the book is an appendix in which are given a number of sayings and proverbs (658), protocols of legal proceedings translated from Kirghis (383), and some wedding songs. The whole constitutes a very valuable collection of evidence given by competent persons about the inner life and the social organisation of the Kirghis. But it is only a collection: there is not much arrangement of differing, and sometimes discordant, statements—no synthesis of the parts relating to an important question.

We cannot undertake here to give any complete idea of the habits of the Kirghis, but we would fain extract from Gen. Grodekoff's book some details illustrating the Kirghis's form of thought, and showing how different from ours is the world he lives in, and how ancient are the customs he has preserved down to our own days. The most curious, and perhaps the oldest, is the family organisation. A Kirghis buys young girls for wives, of which he is allowed to possess an indefinite number. The price (*kalym*) he has to pay for a wife is fixed between the match-makers, according to the physical qualifications of the bride, and consists principally of cattle and smaller animals. A man does not go into mourning after his wife's death. He has to show impartiality towards his four youngest wives living, and to observe a strict order in choosing each day one among them to have the honour of presiding at his hearth. A widow who desires to contract another marriage can choose for her second husband a brother or a near relation of the first, though she is considered as appertaining legally to her eldest brother-in-law. A man may with impunity inflict a slight wound on his wife's head, but for a heavier blow, or for blinding his wife or crippling her he has to pay a fine in sheep ; not so large a number, however, as in the case of a similar offence against a stranger. For the murder of his wife a man is fined 500 sheep, or one thousand rubles (£97, 18s. 4d.). A wife is not allowed to argue, but is obliged to do all the work her master-husband is pleased to impose on her. In case of his prolonged absence, a man is permitted to lend his wife to a friend, and even to give her away altogether. No woman is admitted to swear, and there are no goods she can freely dispose of except her garments. The paternal authority is

very great; according to an adage, a son before his father is like a slave before his master. A father is allowed to renounce his son, in the event of his refusing to avenge him for an injury, and he can give his daughter in marriage against her consent, or even present her to a friend like any other chattel. It is he who has the benefit of the *kalym*, and, therefore, the possession of daughters brings a man fortune. The maternal authority is insignificant. After the death of a man, his widow, when she has children, is put under the guardianship of his eldest brother or other near relation. Children are declared adult at the age of twelve and even nine years, according to their intelligence. The boys marry, when there are means to pay the *kalym*, at the age of twelve, and a little girl four years old is occasionally betrothed.

There are, however, some institutions which give a more favourable idea of the Kirghis. They practise the most generous hospitality, and hold in high respect the solemn declarations which create bonds of brotherhood between man and man. A guest is called *khudaï-kunak*, that is, "God's friend." Being informed of the arrival of a guest in the camp, the proprietors of the nearest kibitka (or tent) hasten to bring him food. It is left to the choice of the guest to invite his host to partake of the repast with him or simply to leave him the remains. If a traveller halts before sunset near a kibitka, its owner seeks a sheep for the stranger's supper, or contents himself with addressing to him a few kind words. Should the stranger not be satisfied with the latter, and should he kill a sheep in order to appease his hunger, without asking the leave of its proprietor, it is not he, but the latter who, should a dispute arise, will be censured by the judge. In this connection may be mentioned a pact of brotherhood, which the Kirghis often conclude among themselves, whereby a kind of community of goods among the participators is recognised. The Kirghis wealth consists of herds, which occupy large tracts of pastureland and desert, where a beast can easily go astray or be stolen. Hence they have been led to consider information which puts them on the track of a lost animal as worthy of reward, and hence the institution of *sujuntchi*, that is, the recompence due to the bearer of valuable information. The amount of *sujuntchi* depends on the value of the object to which it refers, from 5 °/₀ to 20 °/₀, the latter percentage being paid when the informants have succeeded in securing the lost cattle after a struggle with the robbers. The *sujuntchi* is of small value when news is reported on hearsay.

The Kirghis have scarcely emerged from a social state where the only right recognised is that of the strongest. They have but a very dim idea of the rights of an individual, and their conception of the individual remains overshadowed by their conception of the tribe. It is as member of a certain tribe and family that an individual takes his rank in society; and, therefore, a respectable Kirghis knows from his tender years at least seven generations of his family tree. Some tribes are powerful, others small. In the province of Tchimkent there are 20,986 kibitkas, divided among twenty-three tribes, of whom the most powerful, *Sirgely*, has 4781 families. In order to hinder the formation of powerful tribes, the Russians have imposed on the Kirghis a

territorial division, independent of tribal divisions. As are the privileges, so also the responsibilities; both are incumbent not on individuals, but on tribes and families. It is the family and the tribe which are answerable for the misdemeanour of their members, and have to pay the *khun* or blood-money in case of murder.

We cannot give an exhaustive description of all the interesting matter in Gen. Grodekoff's book, but what has been said is, we think, sufficient to give the reader a desire to learn more from the book itself. Besides, we may possibly take occasion to return to the subject as soon as we have the two remaining volumes in our hands.

V. DINGELSTEDT.

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## PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

A MEETING of the Society was held in Edinburgh on 23d January, General Sir R. Murdoch Smith in the chair, when Colonel Mark S. Bell, V.C., read the paper we publish this month on "Armenia." After an interesting discussion, in which Major Bennett, the Rev. Dr. Horsely of Ispahan, Mr. James Currie, Mr. Coutts Trotter, and Mr. William C. Smith took part, a vote of thanks was awarded to the lecturer on the motion of Dr. Aitchison, seconded by Colonel Dods.

On the conclusion of Colonel Bell's Address, the Resolution of the Council in favour of an Entrance-Fee of one guinea being imposed on all new members elected after the commencement of next session—notice of which had been given on the billet convening the meeting—was, on the motion of Mr. James Currie, seconded by Mr. Coutts Trotter, unanimously adopted by the Society.

A Meeting of the Society was held in the Synod Hall, Edinburgh, on Monday, 10th February, when His Grace the Duke of Argyll, K.G., K.T., President of the Society, delivered an Address on "Border-Lands between Geography and Geology." Dr. John Murray, on behalf of the Council, welcomed His Grace to the Presidential Chair, and interpreted the thanks of the meeting for his Address.

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## GEOGRAPHICAL NOTES.

### EUROPE.

**A New Map of France.**—A new and corrected edition of the topographical map of France, which was commenced in 1818, will shortly be issued. The map printed from the original copper-plates is now, of course, out of date; but to alter these large plates is a work so tedious, that it has been put off as long as possible, new roads, etc., being marked on the zincographic edition. The latter process, however, lacks the clearness and sharpness of copper-plate engraving, and therefore the *Service Géographique de l'Armée*, presided over by General Derrécagaix, is engaged in correcting the original plates. In the new edition, alterations and extensions of roads and railways will be duly marked, the towns be enlarged to their present size, the spelling of names corrected; and even fortification works will appear. The unwieldy sheets will be divided into four sections each, measuring 40 cm. by 25 cm. (about 15¾ in. by 9¾ in.). Each section will be sold for 50 centimes.—*Petermann's Mitteilungen*, Bd. xxxv., No. 12.

**Foreigners in France.**—M. V. Turquand presented last year a statistical album to the Paris Geographical Society (*Compte Rendu*, 1889, No. 14). It contained, among others, six maps showing the geographical distributions of the different nationalities in France. There are 80,000 Spaniards living in France, most of them in the Basses-Pyrénées and Pyrénées Orientales; it is curious that there are hardly any in Ariège. The Swiss, who also number 80,000, occupy chiefly the basins of the Loire and of the Upper Rhône and Sâone. The Italians are spread over the country from the Maritime Alps to Paris, but are most numerous in the departments of the Alpes-Maritimes, Var, and Bouches-du-Rhône. In the first-mentioned they form one twentieth per cent. of the population. The total number of Belgians in France is nearly 500,000; they dwell in the northern half of the basin of the Seine. Lastly, the Germans are found principally along the frontier, in the departments of the Vosges and the Meurthe. It is a curious fact that the *quartier* of Paris most densely peopled by foreigners of a certain nationality corresponds to the country district where their compatriots are most numerous; for instance, Germans live chiefly in the north-east of Paris as well as of France.

**The Total Number of Frenchmen.**—*La Géographie* gives the total number of Frenchmen in different parts of the world as follows:—

| | | |
|---|---|---|
| In Europe (outside France), | | 201,000 |
| In Africa, | | 21,000 |
| In Asia, | | 112,000 |
| In America | North, | 30,000 |
| | South, | 15,000 |
| In Oceania, | | 3,000 |
| Number of Frenchmen in foreign countries, | | 382,000 |
| To these must be added— | | |
| In France, | | 38,218,000 |
| In the Colonies, | | 6,731,000 |
| Total number of Frenchmen, | | 45,331,000 |

**Area of Austria-Hungary.**—The official return of the area of the countries united under the Austrian monarchy, made in 1888, could not be brought into harmony with the figures for the different countries calculated from the land-tax. Dr. Penck, therefore, has made a planimetric measurement on the excellent new map of the monarchy on the scale of 1 : 75,000. The result is very remarkable, for the area thus obtained exceeds that in the official return by 1254 sq. miles, or more than the area of Mecklenburg-Strelitz. The increase is chiefly in Hungary. Dr. Penck gives for the area of the countries represented in the Austrian Parliament 115,917 sq. miles; for Hungary and its dependencies, 125,604 sq. miles; and for the whole monarchy, 241,521 sq. miles.—*Verhand. der Gesell. für Erdkunde zu Berlin*, Bd. xvi., No. 9.

## ASIA.

**Central Asia.**—The expedition of Colonel Pevtzov was noticed in the *Scottish Geographical Magazine*, vol. v. p. 610. After the expedition had crossed the Thian Shan Mountains, M. Bogdanovitch, a geologist, left his colleagues to make a detour by Chatir Kul, Kashgar, and the glacier-clothed mountains of the Mustagh-ata group. Some account of M. Bogdanovitch's experiences, extracted from letters of Prof. S.

Nitikin, is given in *Petermann's Mitteilungen*, Bd. xxxv., No. 12. The traveller's observations during excursions in the neighbourhood of Chatir Kul convinced him that the limestone so widespread in that country, and assigned by Stolitzka to the Triassic system, really belongs to the Devonian, as shown by the presence of *Spirifera*, corals, *Stromatopora*, etc. All the other formations, being devoid of fossils, cannot be classified with certainty : some of the slates overlying the limestone may be Palæozoic. Between the ranges of Kara Teke and Kok-Tau lie Tertiary (?) sandstones, intersected with veins and laccolites of dolerite. The Artish Mountains to the north of Kashgar seem also to be composed of Tertiary sandstones and conglomerates. The road to the Mustagh-ata from Kashgar, through the valley of the river Goes, being impassable on account of the rain and the melting of the snow, M. Bogdanovitch went on to Yangi Hissar, and thence by the King-kol and Ridshek valleys to the Kara Tash Pass (about 17,300 feet high). He then explored the Mustagh-ata Mountains, which contain peaks 26,000 feet high, and descended to the Little Kara Kul. It is noteworthy that on the north-eastern side of these mountains the snow-line is at an elevation of 13,700 to 14,700 feet, while on the south-western side it lies as high as 17,200 to 17,700 feet. All the glaciers are on the latter side, where they descend to an elevation 12,800 to 13,700 feet above the sea ; but traces of old moraines show that glaciers formerly existed on the north-eastern side also. The whole country is formed of gneiss, with intrusive granite, having a strike running NW. to SE. From the Little Kara Kul M. Bogdanovitch crossed the Ulug-rabat Pass into the Tagharma Valley, and then along the Yarkand River and lateral valleys to the Kysyg-davan Pass. Between the Tagharma Valley and the pass, granite, various quartzites, and clay slates were met with first, then carboniferous slates, probably Mesozoic. M. Bogdanovitch traversed the desolate steppe of the Arpalyk-su, and reached Yarkand on July 19.

In the *S. G. M.* vol. v. p. 611, M. Grombtchevsky's route was traced to Kala-i-Khum, on the Oxus. In December M. Venukoff received a letter from him, dated October 22, which he communicated to the Paris Geographical Society (*Compte Rendu*, January 3, 1890). From Kala-i-Khum M. Grombtchevsky proceeded along the Valley of the Panja towards its junction with the Wanj. There, finding that nearly the whole of Shignan was in the hands of the Afghans, and being unable to obtain permission to cross the Afghan territories into Kafiristan, he turned aside up the Wanj Valley, and crossed the Syr-Artchi to the sources of the Khinchab, in Wakhan. In these high regions the nights were cold even in the middle of August, and in September deep snow covered the ground, which rendered it dangerous to leave the camp in quest of provisions. M. Grombtchevsky therefore decided to march towards the sources of the Aksu and the Taghdumbash Plateau, where he hired thirty yaks to transport his baggage across the Pass of Ily-Su to Kaindyn-Auzy, on the river Ily-Su, a tributary of the Raskum Daria. He arrived at this place in October, and intended to remain there long enough to recruit his men after the fatigues of the journey before proceeding to the sources of the Raskum Daria, in the Karakorum Mountains, and thence to the basin of the Upper Khotan Daria. During his excursions in the country around the sources of the Wakhan Daria and the river Baïkru, M. Grombtchevsky discovered two new passes over the Eastern Hindu Kush, namely, the Kélenj, leading to Kunjut, and the Khudarpurt, leading to Chitral. He met two English travellers, Messrs. Cumberland and Bower, and hoped to fall in with Lieut. Younghusband.

A report has been received by the Russian Geographical Society from Colonel Pevtzov (*Globus*, Bd. lvii., No. 4). On leaving his quarters in the highlands, he visited the Khotan oasis, and then marched through Kiria to Nia. He intends to search

for a pass into Tibet, but, should he not find one before reaching Cherchen, he will ascend the Cherchen river, and reach the Tibetan plateau by the route indicated by Prjevalsky. The work done by the expedition is very satisfactory: the latitude and longitude of ten points have been determined, twenty-five heights have been ascertained by the barometer, magnetic observations have been made at four stations, and traverses extending over some 990 miles have been laid down. The geologists also have accomplished a great deal of valuable work.

**The Mugadshar Mountains.**—Messrs. Paul Venukoff and Levinson-Lessing have been commissioned by the Naturalists' Society of St. Petersburg to investigate the geological features of the Mugadshar Mountains. On May 31st, 1889, the two geologists, accompanied by M. Poléjaéff, a zoologist, and by M. Kransnoyartzeff, left Orenburg for Ak-Tubé on the Ilek. The valley of this river is covered with rich grass, and here and there may be seen huts in which the Kirghiz pass the winter. After passing the mouths of five tributaries of this river, the travellers reached the steppe, carpeted with feathery grass and brightened by several plants of *cruciferæ* and *papilionaceæ*. Wormwood was so plentiful that the whole steppe had a greyish-green hue. As the Mugadshars are approached, the country becomes more and more diversified. Hills, sometimes singly and sometimes in ranges, rise above the plain, and at length the crest of the mountains comes into view. The summits are all flattened or rounded by the degrading action of rain and winds through many ages, and no sharp peaks are to be seen. The highest summit is Airuk, which does not rise more than 1970 feet above the level of the sea. The other important heights are Chélekty-Say, Kunduzdu, Pshindé, and the Daudyntau group. To the south of Airuk the Mugadshars diminish rapidly in height; but some ranges of hills, as the Bakhty-baï, the Jaksy-tau (980 feet), and the Jamantau extend in the same southerly direction. Beyond these the country becomes flat, and the only inequalities of the ground are the steep slopes of the Ust-Urt plateau. The geological structure of the mountains may be observed in the numerous ravines which descend eastwards and westwards from the main ridge of the Mugadshars. The axis of upheaval runs north and south, and forms the watershed between the basins of the Caspian and Lake Chelkar. At certain distances from this axis ranges run parallel to it. These lateral chains are composed of Silurian and Devonian deposits, while in the central part of the Mugadshars are found diorites, diabase, and porphyrites. The geologists of the party are of opinion that the most ancient masses of the system are composed of granite and syenite, but that they have been pierced by eruptive rocks of more recent origin, so that the process of upheaval was continued to the end of the Cretaceous period. The geological structure of the southern part of the Mugadshars is still more simple, for the crystalline axis is composed of plagioclase rocks, and the slopes of the hills of quartzose schists and tuffs, at the foot of which lie deposits of sandstone, formed during the Cretaceous period. In conclusion, it may be said that, in a geological point of view, the Mugadshars are a continuation of the Ural Mountains, though they are separated from the latter by a depression some tens of miles in length, where only sedimentary rocks occur.—*Revue de Géographie*, Nov. 1889.

## AFRICA.

**Kilima-njaro: Ascent by Dr. Meyer.**—This mountain, as is well known, consists of two summits, the Kibo and the Kimawenzi, connected by a saddle studded with hills of lava. From this saddle Dr. Meyer tried, in 1887, to scale the Kibo (*S. G. M.* iv. 53), but had to give up the attempt on account of the weather. Last October he pitched his tent on the saddle, at an elevation of over 14,000 feet, and

on the 3d of the month set forth at half-past two in the morning, accompanied by Herr Purtscheller, and provided with the usual equipment of the Alpine climber. During the darkness they made their way to the glacier valley which descends from the flanks of Kibo in a south-easterly direction, and at dawn stood on the rocky northern boundary, looking down into the valley nearly 500 feet below. Crossing this valley, the climbers reached the ridge of lava forming its southern boundary, up which they purposed to make their way to the summit of Kibo. Here they met with the first patches of snow, lying under the protection of the rocks at an elevation of 16,400 feet. Their route now led over blocks of stone and heaps of *débris* up the steep lava ridge—a toilsome way, where they had to make frequent halts to recover their breath, for the rarity of the atmosphere became more and more perceptible. Shortly before ten o'clock they came to the lower edge of the icy mantle which encircles the summit and conceals it from view. The height of this spot was about 18,270 feet. The rocky declivity over which the climbers had ascended had an inclination of 30° ; the icy wall which rose above it, 35°. Dr. Meyer and his companion found it very exhausting work to scale this slope, cutting steps, as they advanced, in the ice, which, far from being firm at the bottom, became still more unsound and uneven as they ascended. At length the crevasses were crossed, the highest undulation of the ice visible below was surmounted, and, at a quarter-to-two o'clock, the climbers stood on the edge of the crater. Here they perceived that the highest point of the crater wall lay about one and a half hour's march to their left on the southern side. Weary as they were, they did not venture to run the risk of being caught in a fog, or of being obliged to bivouac on the mountain-side without any protection against the cold. They therefore turned back, and after a day of sixteen hours reached their camp on the saddle, congratulating themselves that at any rate the true nature of the summit had been discovered. Three days later they again went forth, and passed the night in a cave they had remarked in the right side of the glacier valley, whither Dr. Meyer's Negro follower carried their blankets, etc. No fuel could be procured ; but, considering the elevation, 15,150 feet, the night was mild (10·5 F.), for their bivouac was sheltered from the wind blowing over the glacier. Starting at three o'clock, the climbers reached the point where they turned back on the former occasion, at a quarter-to-nine. Its elevation above the sea-level was 19,220 feet. Beyond this point no great difficulties were encountered. The edge of ice which runs round the crater slopes gradually up towards the south, where it is pierced by three peaks. It was impossible for the eye to decide which of these three was the highest, and therefore Dr. Meyer ascended all three, and found that the middle one was 50 to 65 feet higher than the others. This, the highest point in German territory, being somewhere about 19,680 feet above the sea-level, he named "Kaiser Wilhelm Spitze." From this position the crater could be well observed. Its diameter is about 6500 feet, and it sinks to a depth of 650 feet. On the north and east the ice descends from the edge inwards in steep terraces, while on the west and south lava precipices take its place. A little to the north of the centre a slightly arched eruptive cone, composed of dark-brown ashes, rises to a height of 490 feet above the crater bottom. Its upper portion is bare, but its base is covered by a mighty glacier which escapes from the crater through a cleft in its western side. About a fortnight later, Dr. Meyer visited the northern side of the mountain, where he found the ice mantle much narrower than on the other side, beginning at an elevation of 18,820 feet, but so steep and hard that only experienced mountaineers would be able to cross it. He also descended through the great eastern cleft into the crater itself. Dr. Meyer also made several expeditions up Mawenzi, or Kimawenzi. It is evident that a much longer period has elapsed since this crater

became extinct, for the whole mountain is riven, eroded, and degraded in a marvellous manner, so that it is both difficult and dangerous to climb over its rocks. Dr. Meyer considered it vain for two men to attempt the ascent of the highest pinnacle, but he reached the top of another not much lower, which he found to have a height of 17,250 feet. Towards the east the flanks of the mountain sink precipitously. The lava is so friable, and has been so much denuded by wind and rain, that the mountain is reduced to a mouldering skeleton. It is a mass of turrets, pinnacles, pyramids, and battlements, intermingled with heaps of detritus.—*Petermann's Mitteilungen*, Bd. xxxvi., No. 1.

**The South of Tunis.**—M. Ed. Blanc contributes a paper to the *Bull. de la Soc. de Géog. Commerciale de Paris*, tome xi., No. 4, on the agricultural and commercial capabilities of the southern part of Tunis. It is, he affirms, more easy of access than the south of Algeria, and more suitable for colonisation. The north of Africa, from the Atlantic to the Syrtes, is divided into three characteristic zones: a low tract of land capable of cultivation along the northern coast; an intermediate tract of mountain ranges, where pastoral pursuits only are possible; and the region of the Sahara, in which are many fertile patches, offering certain opportunities for European enterprise. These zones are not absolutely parallel, but converge towards the eastern end, so as to bring the southern zones into higher latitudes, and diminish the distance of the southern fertile lands from the northern towns. Again, as the Syrtes cut across the direction of these zones, the oases of the south of Tunis are not far removed from the sea, and are easily reached from the Gulf of Cabes. A series of plains along the coast renders them more accessible from Tunis by land than the south of Algeria is from the northern coast. The population, the basis of which belongs to the Berber race, is on the whole of a peaceful disposition, and possesses considerable aptitude for commerce and industries. The northern shore region, corresponding to the Tell in Algeria, is very narrow in Tunis; but this deficiency is partly compensated for by the valleys of the Medjerdah and Milleg, which here widen out into large plains, where wheat may be cultivated, except in years of great drought. Beyond these valleys extends a country of rocky mountains, devoid of water, and separated by vast plains and arid plateaux, where the soil is entirely composed of gypseous and saline clays. There are, however, many parts where the soil is good, the vegetable earth being of great depth; but these are rendered barren by the absence of water. The line through Kairwan and Kef marks, then, the southern limit of the territory which is adapted for colonisation. To the south, however, of the inhospitable region lies another, which may sooner or later be opened to commercial enterprise—the region of the oases. Here olives, fruit trees, and, above all, the date-palm, yield large crops, wherever there is water to irrigate the soil. There are four principal groups of oases: the Aarad, on the Gulf of Cabes; the Jerid, on the neck of land between Shott Jerid (or Kebir) and Shott Rharsa (or Gharsa); the Nefzaua, on the tongue of land between Shott Jerid and Shott Fejej; and the northern oases in the neighbourhood of Gafsa. Of these the first is far the richest, containing the four finest oases in all Tunis: Tuser, Nefta, El Udian, and El Hamma. The first has a population of 6000, the second of 9000. The principal product is dates. Tuser alone exports about 6860 tons annually. This town produces also the finest burnous and haïks in the country. The former are woven of very fine white wool, and fetch 16s. to 28s., or occasionally even 32s., a piece before they are stitched. The haïks are rectangular pieces of material, 13 to 16 feet long by 5 to 6 feet wide. The warp is composed entirely of wool, and the woof is striped with bands of white silk. They cost nearly 6s. a yard, and are worn just as they come from the loom. In Nefta

haïks of a very fine quality are made, in which silk largely predominates, and others in which the silk is replaced by camel's hair. Nefzaua contains 1003 oases, some forty of which are of considerable extent, and a population of about 25,000. Olive trees are more numerous than in the Jerid. The industries are unimportant. Gafsa, in the northern group of oases, is very favourably situated. Here, at 8° 55′ 9″ E. long., the bed of the Baïech, which formerly carried down a large volume of water to Shott Rharsa, has formed a breach about 1100 feet above the sea between Jebel Orbata (3840 ft.) and Jebel Ben Yunes (3940 ft.), and affords the only practicable means of access to the south, except the coast route. This spot is naturally the meeting-point of the main highways of the country, and a town was founded here in very ancient times, bearing the name of Capsa. The bed of the Baïech is now dry throughout the year, but a number of warm springs supply enough water to irrigate a large oasis (2720 acres), which is but half cultivated. Olives are the most numerous trees. Palms grow there, of course, and also apricots, oranges, lemons, etc. The textures are of excellent workmanship, and of fantastic patterns, often representing camels, fishes, and other living objects. Their dyes are most of them aniline, imported from Germany. The largest oases of the Aarad are Cabes and El Hamma. The dates produced in these oases are of very inferior quality, but other forms of vegetation are most luxuriant, and gardening is carried to a perfection not attained in any other district of North Africa. Figs, olives, vines, apricots, and pomegranates grow here in profusion. Various kinds of textures are manufactured here also, in particular fine and thick carpets of all sizes, adorned with a variety of elegant patterns, the warp of which is composed of camel's hair. Weaving is also an important industry in the island of Jerba, where, also, pottery is made, and fine sponges are obtained. The agriculture of these oases is to a large extent paralysed by excessive duties. These weigh most heavily on the cultivation of dates, for every tree pays a tax whether it bears or not, so that the inhabitants have in some cases given up this occupation. Besides this tax, dates pay an *ad valorem* duty when sold, and heavy exportation dues. The sandy tracts are comparatively small, the sterility of the soil in most parts being due solely to the want of water, and therefore there are many spots where agriculture might be carried on with the aid of artificial irrigation.

**M. Trivier.**—The continent of Africa has been crossed for the first time by a Frenchman. M. Trivier left Bordeaux on August 21st, 1888, and arrived at Mozambique on the 6th of last December. He ascended the Congo to Stanley Falls, where he made a bargain with Tippu Tib to be conducted to the East Coast. He then proceeded to Nyangwé, and the last letter received from him was dated from Kasongo, April 13th. The remainder of his route is as yet unknown, but, from a short telegram received by the *Gironde*, it may be conjectured that he has visited the lakes from which the Congo flows, and has advanced to the valley of the Zambesi.—*Revue de Géographie*, January 1890.

## AMERICA.

**The Climate of Canada.**—M. D. Bellet contributes to the *Compte Rendu*, 1889, No. 14, a note on some tables furnished by the director of the MacGill Observatory, Montreal, to General Greely. The observations extend over fifty years, from 1839 to 1888 inclusive, and form an exhaustive exposition of the climatic conditions of the country. During those years the variations of the seasons have been confined within very narrow limits. The last frosts have occurred at the beginning of May ; the earliest spring was that of 1878, when the last frost was on April 2, and the

latest was in 1856, in which year the thermometer fell to freezing-point on May 21. The frost, except in 1867 and 1874, always returned before November, the latest recorded being on the 5th of that month and the earliest on September 15 in the year 1859. In 1860 snow fell on September 29, the only occasion when it fell during that month. Its latest appearance was in 1846 on November 28. In 1839 snow ceased to fall in March, an event which did not happen again until 1889. The latest snow recorded fell on May 27, 1871. Snow fell during this month in only nineteen years out of the fifty. The mean temperature at Montreal during the seven years 1851 to 1856 inclusive was 41°·56 F., the maximum 100°·1 F., and the minimum 36° F. During the fourteen years ending in 1888 the mean was 41°·58 F., though the last year the mean was only 39°·83 F. The mean rainfall for 1851 to 1857 was 43·004 in., and for the last fourteen years only 27·2 in.; but the figures for the months of July and August 1888 are the largest recorded. The annual fall of snow for the years 1851 to 1857 was 95·76 in.; for the fourteen years ending in 1889, 125·8 in.

**Map of the Duck and Riding Mountains, Manitoba.**—Mr. J. B. Tyrrell has sent his preliminary map and notes, published by the Geological and Natural History Survey of Canada, in which he holds the position of field geologist. The area represented by this the first Canadian contour map is 12,000 sq. miles, but Lake Winnepegosis is merely sketched in from former surveys, and the Porcupine Mountain on the north-west corner has not yet been explored, so that the area mapped out in detail is 8500 sq. miles. Mr. Tyrrell gives a short description of the country, which is interesting from the traces of the old shore lines of "Lake Agassiz."

**From Paraguay to the Amazon.**—*Globus*, Bd. lvi., No. 21, gives a sketch of a journey undertaken by Dr. Paul Ehrenreich from Cuyaba to Para. He left Cuyaba on May 17, 1888, and followed at first the eastward route taken by Count Castelnau in 1884, but afterwards turned into a new route leading towards Goyaz. Reaching the Araguay at Leopoldina, he descended that river as far as the cataracts in a steamer. The Carayo Indians on its banks have preserved their ancient manners and customs, though the river has been a highway for traffic during the last 150 years. In morality they are superior to the civilized men they are brought into contact with. They wear a wooden peg in the lower lip as the Botocudos do, and keep a singularly large number of tamed and domestic animals. The passage of the cataracts is at many points attended with great danger. It seems scarcely possible to render this portion of the river navigable by regulating its bed, but a railway might be made to complete the communication.

## COMMERCIAL GEOGRAPHY.

**The Railways of Japan.**—The construction of railways was commenced in Japan about twenty years ago, and now 579 miles of line are in working order, of which 497 are in Hondo and the remainder in Yezo. Some of these lines belong to the State, others to the Japanese Railway Company. The former run from Tokio to Yokohama; from Yokohama to Kodzu; from Kobe through Ozaka and Kioto to Otsu on Lake Biwa; from Handa through Nagoya and Nagahama to Tsuruga on the west coast of the island; from Takasaki to Yokokawa; and from Naoyetsu to Sikiyama. The company's lines run from Tokio to Sendai, and from Tokio to Takasaki and Mayebashi. In Yezo there are only two State lines—the one from Otaru to Sapporo and thence to the coal mines of Horonai, the other connecting the sulphur mines of Kushiroko with the river of the same name. Besides the

above-mentioned lines there are in course of construction a line connecting Kodzu and Nagoya, with a branch to the naval station Yokosuka ; another from Yokokawa through Nagano to Sikiyama ; a branch from the Sendai line to Utsunomiya and Mito ; and a line from Koyama to Kiryu through Tochigi, Sano, and Tatebayashi. Lastly, numerous lines are projected, of which one from Sendai to Aomori at the northern extremity of Hondo is among the chief.—*Compte Rendu de la Soc. de Géographie*, Paris, No. 14, 1889.

**Navigation of the Upper Yang-tse-kiang.**—A short account of Mr. Little's enterprise was given in the *S. G. M.* vol. v. 47. When Mr. Little had had his vessel built and taken out to China, and a most important scheme was on the eve of realisation, everything was stopped by the opposition of the Chinese authorities. *The Times*, 9th December 1889, lays the blame on the British Foreign Office and its representative at Pekin. Obstruction, delays, and subterfuges, it says, were to be expected of the Chinese Government, but the British Ambassador should have refused to listen to any excuses. Instead of that, he refused to allow Mr. Little's vessel to ascend the river without a permit from the Chinese authorities, which is not required by existing treaties. Of course, the permit never arrived, and the vessel and crew lay month after month in idleness. It is fortunate for Mr. Little and his company that they have recovered their capital by selling the vessel to the Chinese.

**The Commerce of the Malay Peninsula.**—Lieut.-Col. Sir Andrew Clarke delivered an address before the London Chamber of Commerce on 6th November 1889 (*Ch. of Com. Journal*, 5th December 1889), in which he demonstrated the remarkable rapidity with which the British protected states have developed. The foreign trade of Perak has increased from £248,796 in 1876 to £3,134,685 in 1888 ; and the little state of Selangor, with an area of about 3000 sq. miles, which in 1873 had practically no trade at all, exported and imported in 1888 goods to the value of £2,372,756. Revenue and population have correspondingly increased. The twenty miles of railway opened in Selangor in 1887 pay a dividend of 25 per cent., and the eight miles completed in Perak in 1888 pay 8½ per cent. These railways are now being extended, and will promote the prosperity of the country, and yield a satisfactory dividend. Half the tin in the world is exported from these states, and there is a large auriferous region, watered by a navigable stream. The agricultural prospects are equally bright. Perak can produce coffee of fine quality, and yields abundance of pepper and nutmegs. Selangor grows coffee, pepper, tea, and tapioca ; indigo has been successfully tried, and land has been granted for the cultivation of tobacco. In Sungei Ujong 35,871 acres are already under cultivation, and good crops of coffee are produced. Pahang, which has only recently been received under British protection, has hardly been exploited at all ; but it will probably prove to be the richest of all these states. Besides its mines, it has fine timber, and most tropical products have been grown in small quantities.

**The Trade of Marocco.**—Sir J. H. Drummond-Hay believes that Marocco might export a large quantity of agricultural produce under a just and prudent Government. The soil is very fertile, particularly in the southern provinces, and produces wheat, barley, maize, and other grains, cotton, oil, fruits, cattle, etc. The people are strong and intelligent, and the climate more temperate than in southern Spain. But the inhabitants do not care to waste their labour in producing more than suffices for their maintenance, when any surplus there may be is taken from them by the tax-collectors, and any show of wealth attracts the unpleasant attentions of the Government officials. The prohibitions and duties on exports also exercise

a prejudicial influence on agriculture, as was proved in the case of maize. Sir John Drummond-Hay succeeded in getting the prohibition on the exportation of that grain removed by the Convention of 1856. The first year one vessel only was laden with maize, but in subsequent years one hundred vessels were annually laden with it, and a large quantity of fresh land was brought under cultivation. Yet, in spite of the fanaticism of the Sultan's advisers and the unsettled state of the country, trade does to some extent increase. In the years 1875-1885 the value of the imports averaged £1,033,918 annually, of which about three-fourths represented British goods. The imports at Tangier in 1887 amounted to £748,000, about £62,000 more than in the previous year.—*Chamber of Commerce Journal*, 5th December 1889.

**Progress of Colombia.**—*The South American Journal*, December 1, 1889, gives some extracts from a report on the commerce of Colombia by Mr. T. H. Wheeler, British Consul at Bogotá. He finds that a decided improvement has taken place in the condition of trade since his former report in 1888. The imports for that year valued £1,064,225, an increase of £204,965 as compared with the figures of 1887; and the exports amounted to the value of £1,396,322, an increase of £270,496. Great Britain's share in the trade is on the increase; for 1888 it was 49 per cent. of the imports and 34 per cent. of the exports. A railway from Bogotá to Facatativá has been completed; it is not a success financially, but will be of great service to the country, and will no doubt yield a profit later on. A telegraph line has been laid to Villavicencio, the chief town of the Llanos, and several new cart-roads have been made.

**Ship Railways.**—The plan of carrying vessels overland is not a new conception. Mr. Eads, an American, proposed some five years ago to construct a railway for this purpose across the isthmus of Tehuantepec (*S.G.M.*, vol. i. p. 60), but it was considered by most people as a chimerical scheme. Now, however, such a railway, though on a smaller scale, is actually in course of construction. The *Chamber of Commerce Journal*, November 5th, 1889, contains a report of an address delivered by Mr. William Smith, C.E., before the London Chamber of Commerce, in which he gave a few details concerning this line, and explained his flexible car system. The railway will cross the Isthmus of Chignecto, which connects Nova Scotia with New Brunswick. It will be 17 miles in length, and capable of carrying a vessel of 1000 tons dead weight, or 500 tons register laden. The ship will be raised by hydraulic rams at one end, and be placed on the railway, which will ascend from the shore at a gradient of 1 in 2000. Mr. Smith claims for the flexible car system the advantages of uniformly distributing the load over the skin of the ship, of enabling the line to ascend at any usual railway gradient, and of admitting curves, shunts, and points, owing to the flexibility of the wheel base. The first object is attained by the use of tubes of indiarubber and canvas, placed athwart the ship and rising to the level of its deck. These are filled with water enough to rise to Plimsoll's mark when compressed by the vessel, which will accordingly be waterborne, just as though it rode in a tank lined with a thin film of water. But, whereas such a film would flow towards the hinder part of the ship on ascending an incline, the water in Mr. Smith's system simply presses with greater force against the hinder side of the tubes. The bottom of the car rests on two trains of trucks on each line, but is connected by a pin with one of the trucks only, so that the train is free to follow the curves of the line. A railway of five lines would carry a flexible car for a ship 270 feet long and of 2000 tons burden, and might be adjusted for larger ships at a moderate cost by adding one or two more lines. To receive the ship the car would be run into the sea down a gradient of 1 in 50, and

under the bottom of the ship. Not only might such railways be used for crossing isthmuses, but also for carrying ships to inland towns—Birmingham for instance—thus saving expense in unloading, etc. Mr. Smith stated that a ship railway would cost only £60,000 per mile, while the average cost of ship canals is £200,000; and estimated that the railways he mentioned as proposed to connect certain towns in England with the sea would reduce the rates for the carriage of goods one-sixth to one-twelfth of the existing rates. Some of the engineers present took exception to some of Mr. Smith's statements. It was doubted where the cushions would compensate for difference of gradient, whether the friction of their sides would prevent the vessel from moving in a longitudinal direction to a dangerous extent, and whether their seams would resist the pressure of the water when not counteracted by the weight of the ship, though it might not amount, as Mr. Smith affirmed, to more than 13 lbs. per square inch. These and other questions have not at present been answered by engineers with certainty and unanimity, but Mr. Smith's scheme is certainly ingenious, and may prove to be practicable some day or other.

## NEW BOOKS.

*Palestine.* By Major C. R. Conder, D.C.L., R.E., Leader of the Palestine Exploring Expedition. London: George Philip and Son, 1889. Pp. viii. + 270. *Price* 3*s.* 6*d.* (Series: "The World's Great Explorers and Explorations.")

The scientific exploration of Palestine was begun in recent times by Dr. Edward Robinson, of the United States, his first journey being undertaken in 1838. The work which he so opportunely began was carried on by De Vogüé and Waddington. Public attention in Great Britain was first drawn to the great opportunities of Palestine exploration,and to the probable wealth of information lying buried in the ruins of the Holy Land, by Sir C. Wilson's survey of Jerusalem, and his explorations in other parts of Palestine, in 1864-66. The first work undertaken for the Palestine Exploration Fund Society was the series of excavations made by Sir C. Warren around the walls of the old Temple at Jerusalem. The success of these labours stimulated the Fund Society to undertake the systematic survey of Palestine from Dan to Beersheba, and from Jordan to the Mediterranean. The work was commenced in 1872, the leadership of the parties engaged in the field operations being intrusted to the writer of the present book, Major Conder, of the Royal Engineers. The survey was completed in 1877. Four years later the survey of Palestine beyond Jordan was commenced, Moab being the region to be first attacked. But the work had shortly after to be abandoned, owing to the hostility of an Arab tribe, and the more formidable jealousy of the Turkish officials. The Ottoman Government has, we believe, within the last few weeks, once more authorised the continuance of the work of exploration in Moab beyond Jordan.

The present volume purports to give a general account of the facts or results of the exploration of Palestine, conducted by the parties under Major Conder's command, together with "a sketch of the mode of search whereby they were brought to light." Major Conder says, in his preface, that "the full story of the dangers and difficulties through which the work was brought to a successful conclusion cannot be given in these pages." But that, considering the general character of the series to which this book belongs, and especially the editors' prospectus, is precisely what we expected to find—either that or a connected account of the actual results of the work of exploration, arranged and systematised. The book falls neither within the one category nor the other. We should have had more

chapters like the one entitled "The Survey of Moab," in which the element of personal adventure and personal labour is predominant, or else more like the excellent account of early travellers who have visited Palestine and written about its topography, contained in the introductory chapter, or more like the admirable summary of the "Results of Exploration" gathered together in Chapter VII. Controversial matter on points of archæological or historical interest would have been more appropriate in a strictly scientific work; the general reader does not as a general rule care to enter into such discussions. But in spite of these adverse criticisms, we are bound to acknowledge that the book is a most useful one—a book that all who wish to understand the geographical relations of the region that figures in the sacred Scriptures ought to possess. It is a most valuable repertory of facts, and throws light upon many interesting historical events. The mention of a site, discovered by the explorers, generally serves as a nucleus around which to gather a series of historical occurrences, all relating more or less to that site. In this way the author helps us to understand the history of Palestine by investing it with the attractions of local interest and local colour. To the execution of his task Major Conder has brought his well-digested stories of historical and antiquarian knowledge, a sincere love of his subject, an evident desire to interpret the results of his labours in a candid and fair spirit, and considerable skill in geographical description. The book contains several skilful portraits of towns, sites and other topographical features. Besides the chapter to which we have already alluded, there are others entitled "Explorations in Judea," "The Survey of Samaria," "Researches in Galilee," "Explorations in Gilead," and "Northern Syria," and three appendices, a "Note on Jerusalem Excavation," and indexes of Old and New Testament sites identified in Palestine. There is also a good index to the work itself, which contains, moreover, portraits of Dr. Robinson, Sir Charles Wilson, and Sir Charles Warren, and some good maps and illustrations. But the illustrations are unequal, some being far from satisfactory.

*Stanley's Emin Pasha Expedition.* By A. J. Wauters. With Map, thirty-four Portraits and Illustrations. London: John C. Nimmo, 1890. Pp. 369. Index. *Price 6s.*

There is no indication to show that this book is a translation, except here and there the faults of style and incorrect spellings observable in the text. Coming from the pen of so accomplished an African geographer as M. Wauters, it is scarcely necessary to say that the information given in regard to the geography of the Congo and Upper Nile basins is trustworthy; at the same time, as a prominent supporter of the Belgian administration of the Congo Independent State, if not as its chief mouthpiece, his views are naturally biassed, and must be received with reserve. Thus, in dealing with political events, he speaks, not as an independent witness but as an official. Of the events that led up to Emin Pasha's critical position in the Equatorial Provinces, little need be said: they are described faithfully and well. The author also gives the most comprehensive account yet published of the progress of the Relief Expedition. But his appreciation of the various actors in his story is, in two cases at least, very far from being a just one. He falls in very readily with the erroneous views that latterly have had such currency regarding the administrative capabilities and the mental capacities of Emin Pasha. When one considers under what terms Dr. Emin undertook the government of the Equatorial Provinces; when one remembers how rapidly he brought them under control, returning in a few years a large surplus to the Egyptian Exchequer instead of the usual annual deficit; when one recalls his

effective measures for the suppression of the slave-trade ; and, finally, remembering how, surrounded on all sides, and in his own provinces, by enemies, traitors, and black-legs, he, nevertheless, for twelve years and more, worthily and effectively maintained his position as the most advanced post of Christian Europe in the Sûdan, —one is filled with wonder at the ingratitude and short memory of his critics. The self-effacement and devotion to duty, patience, and relative success, evinced by Emin Pasha's rule in Africa, has rarely been equalled and has never been surpassed. His fall from power cannot fail to bring about the most disastrous issues to African civilisation. M. Wauters' remarks on Major Barttelot are equally unjust ; and he is not always correct in his judgment regarding the various routes it was originally proposed to take to Wadelai.

Mr. Wauters, on page 126, says :—"To the Geographical Society of Edinburgh belongs the honour of taking the initiative in reducing sympathy [for Emin's position] to practice." He then quotes the Resolution arrived at by the Society's Council at its meeting on 23d November 1886, and forwarded to the late Lord Iddesleigh, then Foreign Secretary.

It is surprising to read, on page 67 : "What becomes of the Wellé [river] after its confluence with the last of the above tributaries [the Mbomu] must as yet be held as an open question." Considering that the author himself was the first to identify the Wellé as the upper course of the Mobangi, and that this identification has recently been placed beyond dispute, it is evident that the passage in question was written a long while ago. With the exception of these few blemishes, the book, being well written, fairly well illustrated, and provided with a good map, is by far the best account we have of the subject with which it deals, and is not likely to be surpassed in interest except by Mr. Stanley's own volumes.

*The Story of Emin's Rescue, etc.* Edited by J. Scott Keltie. London : Sampson Low and Co., 1890. Pp. 190. *Price* 1*s.*

A reprint of Mr. Stanley's letters, with an introduction by the editor, Mr. Scott Keltie, the librarian of the Royal Geographical Society of London. In this inexpensive and handy form Mr. Stanley's letters will be welcome to many.

*England and South Africa.* By E. J. Gibbs, M.A. London : Longmans, Green and Co., 1889. Pp. 151. *Price* 5*s.*

In dealing with matters of political controversy in South Africa, the author shows considerable familiarity with his subject, and, though himself taking a biassed view, advocates a sound Imperial policy. He, however, goes very wide of his scope in several places, and lays himself open to attack in others. Abundant quotations amplify his text. The book requires more careful revision and a good map to illustrate it.

*The Colonial Year-Book for* 1889. By A. J. R. Trendell, C.M.G. With introduction by J. R. Seeley, M.A., Regius Professor of Modern History in the University of Cambridge. Sampson Low and Co., pp. xxix. + 753. *Price* 6*s.*

The plan of construction of this book is excellent, and its *ratio existendi* so obvious that we wonder at its not having appeared long before. We gladly assume, however, that its appearance now is a fresh sign of that awakening of interest in our Colonies for which Professor Seeley, in his *Expansion of England*, pleaded with so much eloquence and force. In his introduction to the volume before us he has skilfully epitomised in a few pages some of the leading ideas of that most valuable

work ;—*e.g.* the gradual and haphazard occupation of distant lands, resulting at first from the expansion of commercial activity, but leading to fierce wars for their retention ; the slowness to comprehend even the material value of our colonies, and still greater slowness to perceive their higher meaning and importance ; and finally, the intimate interdependence and community of interests among all the branches of the empire, increasing daily as the means of intercourse become more perfect, so that the supreme danger now to be guarded against is not so much an invasion of the coasts of Britain, as an interruption of the oceanic communications of the realm.

The plan of the writer of the *Year-Book* is to give—at all events for each of the more important colonies—first, a certain amount of permanent information, such as its history, with some notice of its physical geography, products, and population ; and then the more fluctuating statistics of trade, lists of banks, of officials, details of routes, and the like, which will, we suppose, be revised annually. The design, as we have said, is good, and the volume contains, in a new and convenient form, much useful information. But there are many signs of want of care in the compilation. For instance, there is a good deal of needless repetition, and of misspelling of names—at least five instances of this occur on p. 92 alone ! Fiji should hardly be described as lying half-way between Tonga and New Caledonia, and still less the island of Perim as having an area of 3000 square miles. The "indications of gold" in Fiji are very doubtful indeed, and this, and not the Government regulations on the subject, is the sufficient reason why it is not worked.

The writer is surprised at the fatal effects in Fiji of the first outbreak of measles, considering the mildness of that disease with us. He forgets that our constitutions have been, so to speak, hereditarily inoculated, and the disease thereby rendered a mild one. Besides, in this country, those suffering from it would hardly be allowed to rush into the sea to cool themselves ! The classification of the natives of New Guinea can hardly be disposed of accurately in a couple of sentences, and more is known about them than the author supposes. It is a mistake to say that the Cape gooseberry (known in India as the *tipari*) grows nowhere in the world but at the Cape. In the account of Mauritius, the amount of sugar exported is given for one year only, and no allusion is made to the critical state of the most important industry of the colony.

It is a mistake to speak of the Presbyterians of Victoria (Australia) as "Nonconformists," seeing that neither the Anglican nor any other Church is "established" there. That "no State assistance is now given to emigrants from Europe" is rather due to the jealousy of the trades'-unions, desirous not to admit further sharers of the "Wage Fund"—(as if that were a fixed quantity)—than to the "flourishing condition of the colony." The writer, for convenience, groups certain islands recently annexed in the Central Pacific, and lying roughly between 8° N. and 12° S. lat., and between 150° and 160° W. long., as the "British Sporades." He omits to mention the island of Rahahanga among those last annexed : it is slightly to the W. of the meridian 160°, but should have been mentioned either here or as belonging to the Manahiki group (p. 202). He speaks of Palmerston Island, a small cluster in the N. of the Cook or Hervey group, as having been annexed. We fear he is mistaken, and that it was omitted, although, as it belongs obviously to that group, its annexation by us would be merely a protective measure, and in no sense aggressive. The same remark, we may point out, applies to the neighbouring Nassau Island, and to Danger Island or Pukapuka, which owes all its civilisation to British efforts. All these three should be added to the Rarotonga Protectorate, the value and completeness of which would be much affected if certain points within its area were occupied by another power.

## NEW MAPS.

**AFRICA, STANLEY IN ——, 1867 to 1869.**

*London and Liverpool: George Philip and Son. Price* 1*s.*

This is an excellent map of Equatorial Africa, showing not only the correct political boundaries of states, but also the routes taken by Mr. Stanley in his various expeditions. Mr. Ravenstein contributes an account of the explorer's travels, printed on the reverse side of the map.

### NORTH AMERICA.

**NICARAGUA-SCHIFFSKANALS**, Pläne und Profile des ——. Von R. E. Peary. Massstab, 1 : 186,500. *Deutsche Geographische Blätter, Band XII., Heft* 2. *Tafel* 3. *Bremen: G. A. von Halem*, 1889.

**YAHTSE-TAH-SHAH, OR MOUNT ST. ELIAS**, Surveyed by Harold W. Topham. Scale, 1 : 253,440. *Proceedings of the Royal Geographical Society, July* 1889.

### SOUTH AMERICA.

**SANTA CRUZ** (Rio Grande do Sul), Die Kolonien im Munizip ——. Nach den Aufnahmen von Ingenier C. Trein u. a. entworfen von Paul Langhans. Massstab, 1 : 320,000.

**TAQUARY** (Rio Grande do Sul), Die Kolonien am mittlern ——. Nach den Aufnahmen von Ingenier C. Trein u. a. entworfen und gezeichnet von Paul Langhans. Massstab, 1 : 320,000. Nebenkarten: Uebersichtskarte der Kolonien in den Flussgebieten des Botucarahy, Rio Pardo, Cahy, Taquary. Massstab, 1 : 1,000,000. Die evangelischen Pfarrbezirke im Taquay- und Rio Pardo-Gebiet. *Petermann's Geographische Mitteilungen, Jahrgang* 1889. *Tafel* 11 *und* 12. *Gotha: Justus Perthes.*

**MADEIRA, PURUS, AND BENI RIVERS**, Sketch Map illustrating Col. A. P. Labre's explorations in the vicinity of the ——. By W. J. Turner, F.R.G.S. Scale, 1 : 3,000,000. *Proceedings of Royal Geographical Society, August* 1889.

### OCEANIA.

**DER KAISERIN AUGUSTA FLUSS**, Nach den Aufnahmen der wissenschaftlichen Expedition der Neu-Guinea Compagnie, Juni-November 1887. Von Dr. C. Schrader. Massstab, 1 : 750,000.

*Zeitschrift der Gesellschaft für Erdkunde zu Berlin, No.* 140 *u.* 141, *Tafel* 3.

**THE LOUISIADE AND D'ENTRECASTEAUX ISLANDS.** Copied from the latest Admiralty Charts. Scale, 1 : 1,666,666.

*Proceedings of the Royal Geographical Society, September* 1889.

### NORTH POLAR REGIONS.

**GRÖNLAND** nach dem Standpunkte seiner Erforschung im Jahre 1889. Massstab, 1 : 4,000,000. *Zeitschrift der Gesellschaft für Erdkunde zu Berlin, No.* 142, *Tafel* 4.

**GREENLAND.** From the latest Authorities. Scale, 1 : 18,000,000.

**SOUTHERN GREENLAND.** Reduced from the Survey of Captain G. Holm. Showing Dr. Nansen's Route in 1888. Scale, 1 : 3,600,000.

*Proceedings of the Royal Geographical Society, August* 1889.

### WORLD.

**ERDE**, Die politischen Verhältnisse der ——. Von Prof. Dr. Fr. Umlauft.

*Deutsche Rundschau für Geographie und Statistik, Jahrgang* 12, *Heft* 1. *Wien: A. Hartleben's Verlag.*

### GENERAL.

**LINIEN GRÖSSTER SEISMISCHER SENSIVITÄT**, von H. Habenicht.

*Deutsche Rundschau für Geographie und Statistik, Jahrgang* 11, *Heft* 11. *Wien: A. Hartleben's Verlag.*

**INDISCHEN OZEANS**, Tiefenkarte des ——. Mittlerer Massstab, 1 : 50,000,000. Gezeichnet von H. Salzmann.

*Petermann's Geographische Mitteilungen, Jahrgang* 1889, *Tafel* 10. *Gotha : Justus Perthes.*

## NEW ATLASES.

**ATLAS OF COMMERCIAL GEOGRAPHY**, *illustrating the general facts of Physical, Political, Economic, and Statistical Geography, on which International Commerce depends.* By JOHN GEORGE BARTHOLOMEW, F.R.S.E., F.R.G.S. With Introductory Notes by HUGH ROBERT MILL, D.Sc., F.R.S.E. Cambridge : University Press. London : Clay and Sons. *Price* 3*s.*

This atlas appears opportunely. General attention has been directed to the need of paying more attention to the commercial aspect of geography, and there have been published several books which have put the available information in a compact form. But the educative as well as the ultimate practical value of commercial geography depends upon a clear understanding of all the factors that have helped to produce the results we see. Some of the recent text-books have recognised that an accurate knowledge of physical geography is the basis of commercial geography and we are glad to find that in this atlas the general commercial maps of the World, Europe, Asia, Africa, and America show the physical features by clear, although not obtrusive, colouring ; over this are laid the notes as to natural products, trade routes, etc. Some of these notes, however, might with advantage have been made to stand out a little better. There are excellent climate maps of the World, and, on the same scale, numerous maps showing, by well-selected colours, the distribution of various important natural productions. The British Isles form the subject of nine well-printed maps, dealing with climate, industries, and railways.

Dr. Mill's introductory notes add much to the value of the atlas. They will be of great use in indicating to teachers and private students how much may be made of the maps, and in leading them to compare one map with another. The notes, though short, are highly instructive and suggestive. They do not form a text-book, but they show how important it is that text-book and atlas should be used together. While obviously intended mainly for school use, the *Atlas of Commercial Geography* will undoubtedly form a convenient medium of reference in many libraries.

**SCHWEIZ**, Topographischer Atlas der ——, im Massstab der Original. Aufnahmen nach dem Bundesgesetze vom 18 Dezember 1868 durch das eidg-topogr. Büreau gemäss den Directionen von Oberst Siegfried veröffentlicht. Lieferung XXXIV. :

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| No. 202, . . . | Rothenburg. | No. 208, . . . | Weggis. |
| „ 247, . . . | Schännis. | „ 249, . . . | Bilten. |
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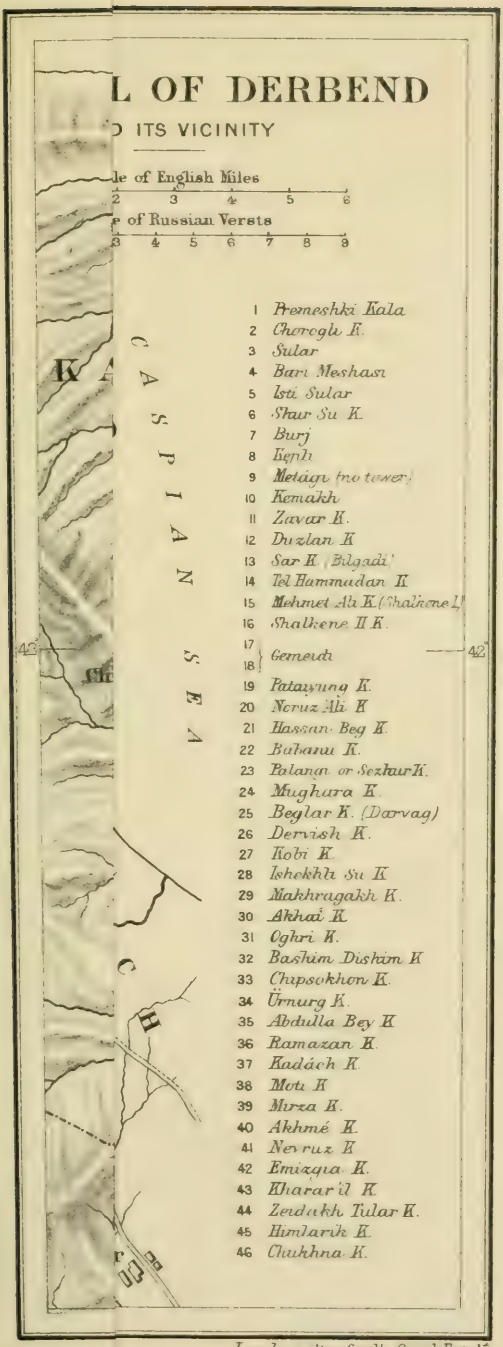
| „ 438 bis, . . | Ouchy. | „ 464, . . . | Vevey. |
| „ 466, . . . | Bouveret. | „ 501, . . . | Simplon. |

**NEW GENERAL ATLAS OF THE WORLD**, containing all the latest geographical discoveries, with general description, Gazetteer, and Alphabetical Index. Edited by G. W. Bacon, F.R.G.S. *London: G. W. Bacon and Co.*

**HACHETTE ET CIE.**, Atlas de Géographie Moderne, édité par ——. Ouvrage contenant 64 Cartes en couleur, accompagnées d'une Texte Géographique, Statisque et Ethnographique, et un grand nombre de Cartes de Détail, Figures, Diagrammes, etc., par F. Schrader, F. Prudent, et E. Anthoine. 3e Livraison. *Paris : Librairie Hatchette et Cie.*, 1889.

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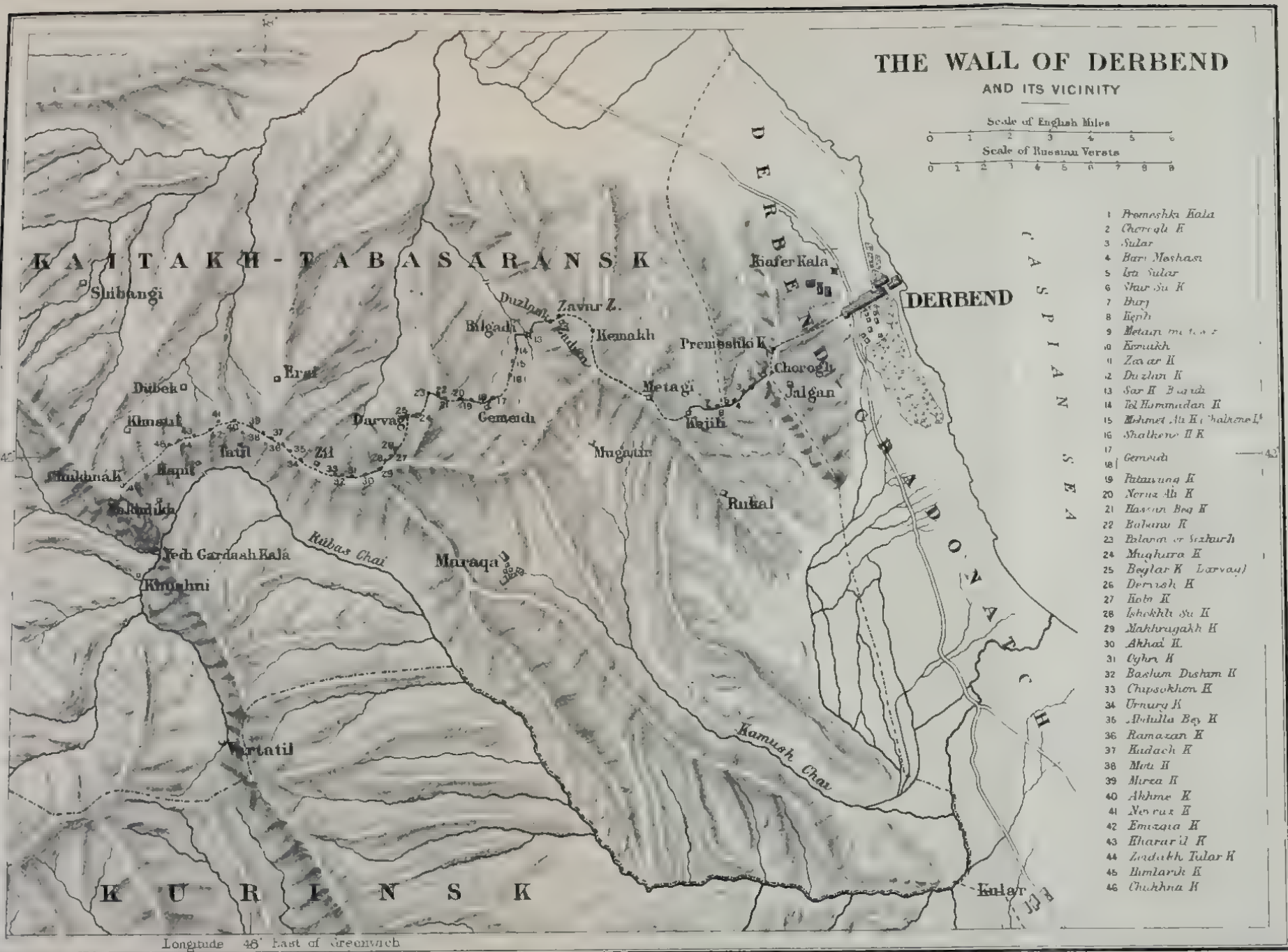


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# THE SCOTTISH GEOGRAPHICAL MAGAZINE.

## BORDER-LANDS BETWEEN GEOLOGY AND GEOGRAPHY.

By the Duke of Argyll, K.G., K.T., etc.,

*President of the Society.*

(*Read at a Meeting of the Society, Edinburgh, on 10th February*, 1890.)

(*With a Map.*)

Strictly speaking, I suppose that Geography has to do only with the present distribution of land and sea on our globe, and that all which concerns the past configuration of the surface must be resigned to the sister science of Geology. We soon find, however, that it is as true of the planet in which we live, as it is true of our own bodies, that what we call the present is a mere moving and ever vanishing point between a past of which we know a little and a future of which we know nothing. No doubt the horizon of the present in existing Geography is a far wider one than the horizon within which the circle of our own little lives is bounded. The units by which we measure time in changes of terrestrial surface are larger units than those by which we measure it in the changes of organic life. But still, in geography, we are constantly reminded that we are dealing with a course of things—with phenomena which are not fixed or permanent, but passing and successive. The present is then indissolubly united with a past—and every line of existing configuration suggests some question as to how it has come to be exactly what is. The consequence is that our Journals and Proceedings are often almost as much geological as purely geographical. And this is especially their character as regards certain regions of the earth on which some excellent geographical work has been lately done. In Greenland, for example, it may be said that the confluence of the two sciences is complete. The existing surface there is a surface in perpetual flux. It is in itself at

once the cause and the result of geographical configuration. Its lofty mountains are storing and accumulating an enormous snowfall. That snowfall is again acting upon the smothered mountains according to laws, and with results which constitute a great problem alike in the geography of the present and in the geology of the past. Allow me to direct your attention for a while to the conditions of that problem, and to the new elements towards a solution of it which our science has recently contributed.

It is now just about fifty years since this country was visited by the great Swiss naturalist Agassiz, who made on us all an immense impression by the enthusiasm of his genius, and the charm of his personality. A child of the Alps, he brought with him an instructed eye on all the work that could be done by ice, as he was familiar with in his native land; and he it was who first convinced British geologists that this work could be traced in abundance on our glens and hills. It was then a new idea, and like almost all new ideas it was soon ridden to the death. There is, I believe, no conclusion of geological science which is more thoroughly established than that which connects the form of many of our surfaces with glacial action, and with a period—very recent—of glacial cold. But far more than this became for a time an almost accepted doctrine. It was thought that mountainous masses of ice streamed out of the Baltic, and off the Scandinavian mountains, filled up the intervening seas, and flowed, or marched, over all our hills, moulding the whole surfaces of our country. Within the last ten years or more there has been some pause, or some reaction, against such extreme theories of glaciation. But they are by no means definitely abandoned; and it is common even now to see effects attributed to glaciers, or ice-caps, or ice-sheets, which it is more than doubtful whether they could ever have produced. It is in its bearing on this question that the interest of Greenland lies.

In the first place, we have to remember the enormous scale on which certain special phenomena are presented to us in Greenland. Nowhere else on our globe, except in the neighbourhood of the Antarctic pole, do glacial conditions exist on anything like that scale. And hitherto the Antarctic lands have been unapproachable. It is to Greenland alone therefore that we must look for any facts bearing on glacial phenomena prevailing universally over any very large area of the earth's surface. How very large that area is we are apt to forget from the geographical position of Greenland—its remoteness, its climate, and its inaccessibility. Yet on many maps of the world it is so represented as apparently to occupy a larger area than the whole of India. This is not correct; and yet it makes a nearer approach to substantial truth than might be supposed from the little we think about it. Its length is upwards of 1380 miles, and its breadth at its broadest stands at about 690 miles. Its area is above half a million of square miles, which is a great deal more than the whole of the Indo-Gangetic plain, carrying more than some 90 millions of population. Now this one feature of mere size or superficial extent has of itself an important bearing on the problems to be solved on the border-land between Geology and Physical Geography. The behaviour of

ice when it is enormous in extent, and so great in depth as to bury under its unbroken snows the hills and valleys of a whole continent, is precisely what we want to know when we speculate on the past of our own latitudes. This behaviour of ice under such conditions is totally distinct from its behaviour when it is in the form of glaciers on the comparatively small areas of steep and narrow mountain ridges. What it does in this form is now tolerably well known. This work has been examined with great care, where it was perfectly accessible to complete inspection and to accurate measurement. But what it may, or can, or will do, when it lies on the whole of a vast country, and is accumulated to a great depth, has been till lately comparatively unknown. And as in other cases of the unascertained operation of known causes under imaginary but conceivable conditions of intensity, it has been the great armoury of theorists in their battle for hypothetical explanations of many of the peculiarities of our existing surfaces. Some of these theories have assumed that bodies of ice so vast in extent, and so great in depth, would move in directions almost independent of the rocky surfaces on which they lie—that they would pass over steep slopes and rocky elevations at all sorts of angles and with great ease, and would then advance along great distances of comparatively level land like vast sheets or streams of liquid lava. It has always appeared to me more than doubtful how far such movements are physically possible. The viscosity of ice, within certain limits, has, no doubt, been clearly ascertained. But it has always been detected and measured under the special conditions of comparatively small bodies of ice lying on steep mountain sides—conditions, it is obvious, under which the action of gravity is at its maximum. But this is the prevailing force to which glacier movements are due. Yet even under these conditions it is remarkable that no Alpine glacier is able to project itself far from the foot of the slope down which it has advanced. And a great majority of such bodies never even reach that point. This, no doubt, is largely due to the waste of melting; and this again arises both from the heat developed by its own friction, and from the warmer temperature into which it passes in its descent.

Now the interest of Greenland lies in this—that there we have a mass of ice with three special characteristics: first, that it is of enormous and what may be called continental size; secondly, that it rests on a country which has a general rising slope up to an elevation of probably 15,000 feet; and thirdly, that it is situated in so high a latitude that the climatic melting season is very short, even at its southern extremity, and at its northern extremity is almost *nil*.

It would be difficult to imagine conditions which represent more completely in our existing world those which many geologists assume as having existed over a much larger part of the northern hemisphere during what is called the glacial age. If ice in enormous masses could ever do the work which it is often supposed to have done in the glacial age, it ought to be seen doing that work now on each of the two sides of Greenland. On the eastern side it ought to be flowing out from the land, and occupying for long distances the bed of the Northern Ocean, ploughing up its submarine deposits far out until it reached the

profoundest depths, which alone could be competent to stop its course by lifting and breaking off through flotation its tremendous ploughshare. On the western side it ought to be filling up the comparatively narrow sea which constitutes Baffin's Bay, and the melancholy channels branching off it, in which so many brave men have pursued their hopeless quest for the North-West passage. Farther north it ought to be occupying as a mere narrow ditch the rapidly contracting bed of Smith's Sound, and then pouring its mighty stream over the opposing hills of Grinnell's Land. These are all of low elevation as compared with the lofty mountainous plateau which lies opposite to them on the east, and which is the unfailing gathering-ground of immeasurable and eternal snows. If our own hills, with maximum heights of a little over 4000 feet, have all been overridden, overflowed, and submerged under an ice-sheet advancing from the far distant polar regions,—not falling from hills, but rising from the hollow of a sea,—how incompetent must the hills of the North American Archipelago be to oppose any barrier to the overflow of the Greenland ice-cap, acting with the comparative advantage of close proximity, and of the impetus due to descent from elevations of from 10,000 to 15,000 feet?

And yet when we turn to existing facts descriptive of the present, as the best and the only means of testing fancies explanatory of the past, we find that in everything those facts are absolutely and almost mysteriously different. So far from flowing out from Greenland over surrounding seas and distant lands, this great ice-sheet does not everywhere reach even its own shores. Along a great part of the coast there is a certain space—sometimes a very considerable space—between the shores of the sea and the margin of the internal ice-sheet. Only at certain places—at the mouth of great glens or valleys—does the ice-sheet reach the shore, and push its glacial precipices and its great submerged ploughshare for some little distance into the adjacent sea. The largest mass of ice which succeeds, so to speak, in reaching the shore of its own harbouring land, is the Humboldt Glacier, which has a frontage of 50 or 60 miles in a total coast-line of above 1300 miles. There are a good many other glaciers of much smaller dimensions which push their way to the sea under similar conditions. But nowhere is the coast as a whole completely occupied by the overflow of the ice-sheet, and nowhere—not even opposite the valleys which afford easier access to the coast—does it project far enough into the surrounding sea-bed as to occupy any appreciable portion of its area. The same facts are repeated on the eastern coast, in some regions of which the wall frontage of the inland ice retires a long distance behind the coast-line, and leaves a space so free from its intrusion that in its sheltered nooks there is an abundant summer vegetation, even permanent thickets of willow and flowering plants of great size and beauty.

It is true that the great sheet or mantle of the inland ice of Greenland suffers waste from streams, and from giving birth to fleets of bergs, some of which are described as of most impressive height and magnitude. But very small masses of any material seem enormous and impressive to us when they appear in unusual forms. A round-topped hill, which seems

quite inconsiderable as a hill, will seem awful and stupendous if broken into a precipice. The highest mountain in the world is measured by a number of feet which looks but a very small distance when measured horizontally. So it is with icebergs. They are among the most beautiful and impressive objects in nature, when they are seen floating in the sea; splendid in colour, peaked and pinnacled in outline, and attaining a maximum elevation of perhaps 300 feet. But when we come to consider that the depth of the inland ice of Greenland is estimated certainly to exceed from 1000 feet to 2000 feet, and may be much greater, and when we further consider that this mass has a circumference of at least 3200 miles, we shall soon be convinced that all the icebergs which float southwards from Baffin's Bay on the west, and from the Arctic Ocean on the east, are as mere grains of sand compared with the immeasurable masses from which they are broken off. Moreover, it is well worthy of remark that even the infinitesimal waste of the great inland mantle of Greenland, which is represented by its annual fleets of icebergs, is a waste which is said to cease altogether to the north of the Humboldt Glacier, which occupies the coast-line of Greenland between the 79th and the 80th parallel of latitude. That is to say, the inland ice of Greenland ceases to reach even its own shores in mass just where the continent on which it lies, and from which it comes, is broadest, and where the channels, which separate it from Grinnell's Land to the west, are both extremely narrow and comparatively shallow. Thus, even under these most favourable conditions for the invasion and overflow of lower lands and seas by an enormous sheet or cap of ice, no such invasion does actually take place. The coast has now been seen and roughly mapped as far north as 83°, and the difficulties of navigation through Kane Sea and Kennedy Channel into the Polar Basin are due entirely to floating or "floe" ice, and not to any obstruction caused by the projection of the inland ice, whether solid in the form of glaciers, or detached in the form of icebergs. Yet on the great projection of the Greenland Coast, which lies north of the Humboldt Glacier, and south of the deep inlet called Petermann's Fjord—a projection called Washington Land—the summit of the ice-cap, close to the shore, presents an elevation of about 6000 feet—high enough certainly to give a tremendous power to gravitation acting on the ice sheet. Nevertheless it does not protrude at all—it does not even fill up the very narrow bed of the Petermann's Fjord.

From all these facts we may conclude with certainty that ice, even of enormous thickness, and resting on a country of vast extent with a thrust or propulsion due to declivities of from 400 to 500 miles in length, encounters such tremendous friction in its progress that it is incapable of movements to any distance from the slopes on which it lies, and that it is arrested altogether by any pronounced inequalities of surface.

The gallant feat, performed lately by Dr F. Nansen, in crossing Greenland from the eastern to the western coast (of which a most interesting account appeared in our August Magazine), has only served to confirm these conclusions as drawn from facts previously ascertained in various Arctic voyages, and in the more systematic surveys of the Danish Government since 1876. Dr. Nansen's crossing of the continent was however

in a very far southern latitude, where it is comparatively narrow from sea to sea—only about 260 miles. Even here the ice-sheet reaches an elevation of between 9000 and 10,000 feet. He calls it a mighty, shield-shaped covering of snow and ice—the top of which is smooth and even, whilst the commencement of the descent on either side is cracked by great crevasses, marking the effects of the tremendous strain and tension of the mass where its position of equilibrium is disturbed.

Our information, however, as to the behaviour of masses of ice resting upon land surfaces cannot be considered as complete without some more accurate knowledge than we possess as to what the exact nature of those smothered land-surfaces may be. Dr. Nansen expresses a decided opinion that the form and shape of the inland ice does not in any degree represent the buried surfaces of the land. He says that all its valleys are filled up, and its ridges covered up to one uniform height, as the inequalities of the surface on a smaller scale in our own country are sometimes completely obliterated and concealed under very deep snow-drifts. That this is true is antecedently probable, and certainly we know of no country so mountainous in its elevation which presents the smooth unbroken shield-like convexity of surface which Dr. Nansen describes. It is rendered still more certain by the fact that near the coast, where a lower elevation and a higher temperature effect great waste upon the inland ice, the surface of the land is seen to have all the rugged inequalities which characterise all other mountainous countries. Many isolated peaks and pinnacles of rock, locally called "nantucks," rise high over the ice mantle near the coast. We may safely conclude that these are carved out of the lower slopes of the higher mountain masses behind, and that Greenland has all the contours of hill and valley which characterise other lands of similar elevation. Moreover, it is this character which alone can account for the comparatively slow progress and practical waste of the Greenland ice-sheet in its movements downwards to the coast.

The most graphic account which I have seen of those movements, and of the striking phenomena which they present, is the powerful description of the great Humboldt Glacier given by Dr. Kane, U.S.A., in his narrative of the "Arctic Explorations" of the second Grinnell expedition in search of Sir John Franklin in the years 1853-55. With the exception of the Great Southern Barrier Ice-cliff in the Antarctic Ocean, discovered and described by Sir John Ross, there is probably no more impressive spectacle on the globe than that long line of Greenland coast over which the inland ice-sheet forces its way to the sea between the 79th and 80th parallel of northern latitude. At the point near its southern termination, from which it was seen by Dr. Kane in the month of April 1855, it presents one long unbroken wall of ice about 300 feet high, stretching in diminishing perspective to the northern horizon to a distance of above sixty miles. As this solid wall of ice is not afloat, we cannot calculate exactly how much of it is hid under water, although still resting on the ground. If it were afloat, a mass of ice in this position, which rises 300 feet above the level of the water, would represent a total thickness of above 2000 feet, and as Dr. Kane declares that the bergs which are shed from it do not represent fragments which

merely tumble off the face of the cliff, but are integral portions of the whole mass which are lifted off by flotation, it is probable that the true dimensions of the bergs, when they are first separated, are really as enormous as those figures represent. But deducting from these figures a fourth, or even one-half, we are face to face with the astonishing conclusion that the inland ice of Greenland, as it reaches the sea in the Humboldt Glacier, is at least from 1000 to 1500 feet thick of sheer, pure, crystalline ice, besides whatever greater thickness there may be in the interior of unconsolidated snow and half-crystallised nevé.

Striking as these conclusions are, arrived at by measurement and calculation in respect to the actual mass of inland ice in Greenland, they are perhaps less impressive than the conclusions forced upon the mind by the visible aspect of this mass, as regards its physical condition and behaviour. It is impossible to look at it, he says, without seeing that it is not a mass at rest, but a mass in motion. "Repose was not the characteristic of this seemingly solid mass: every feature indicated activity, energy, movement."[1] Its surface seemed to follow that of the basis country over which it flowed. It was undulatory on the far inland horizon, where it merged in the mighty central *mer de glace*. But as it descended towards the sea it resembled a broken plain—breaking in the form of steps and terraces, as though falling through loss of support from the sloping surfaces beneath. Cracks and fissures, both transverse and longitudinal, indicated the strains of friction, and made rifts through which the torrents, formed by superficial melting, played into the heart of the mass, and performed their share in facilitating movement. Even the very surface of the glacier was visibly sharing in that movement at an accelerated rate of slip or sheering, so that it tended to overhang the more solid wall of ice in its less resisted motion to the sea. A great propelling agency from behind seemed to be acting on a stupendous plastic mass, and great fleets of its detached fragments were sailing majestically away.

It is impossible to read this account of the Greenland ice-sheet as it is seen at the point where its movement and energy is at its maximum, without being convinced that ice under such conditions, even if they were greatly intensified, is under limitations in respect to what it can do, which render it impossible to assign to it the operations which many recent theories have assumed that it can perform. In the latitude of the Humboldt Glacier Greenland is very broad, and the line of watershed is now probably at least 400 miles from the western coast. Such an amount of thrust acting on such a mass might be supposed to be capable of overflowing and overspreading opposing obstacles to great distances. Yet, as a fact, we see that it is wholly impotent to project itself even a few miles beyond its own supporting land. A whole archipelago of little rocky islands close to the shore, near the southern termination of this great moving mass, are not reached, or are only just reached, by its enormous precipices; and water which is shallow as compared with oceanic depths, is yet deep enough to lift it up, and carry its waste away.

[1] *Arctic Explorations*, Dr. E. Kane, p. 355; ed. 1872.

On the other hand, there can be no doubt that its grinding effect on the surfaces over which it passes, however slowly, must be tremendous. We cannot get at that surface—buried as it is under some 2000 feet of snow and ice—except in a few places from which the glacier has recently retreated, and these spots are sometimes encumbered with transported matter. But if ice be indeed plastic, even in any degree, we may be certain that such an ice-sheet must be pressed down by its own weight into every irregularity of hill and hollow, and must tend to reduce the whole surface to smooth and rounded surfaces. This is the actual result upon all the rocks along the shores which are subject to complete covering under, and envelopment by, even the comparatively light pressure, of the floating or floe ice of those regions. When left exposed they are all completely rounded, and equally so on all sides, so as to resemble the back of a whale or of a seal, exhibiting that characteristic form and aspect called in French "*roches moutonnées*." This is the inevitable work of ice which completely invests rocks, and does not merely impinge upon them in floating past.

Two conclusions are thus forced upon us by recent explorations of Greenland and its adjacent area. The first is that ice-sheets, even of the most enormous magnitude, and moving down slopes of considerable steepness, are incompetent to overflow to any distance any terrestrial surfaces, even those which constitute hollows or depressions below the level of the sea, and are still more incompetent to surmount any opposing elevations above that level. The second conclusion is, that all those surfaces which they do overflow, from excessive accumulations of snow upon mountainous elevations of the land, must be exposed to glacial action all over, and must tend more and more to exhibit outlines completely rounded.

Turning now to our own islands, we see how these conclusions bear upon all the questions arising out of their physical geography. They are far removed from any higher mountainous region which could give rise to the same cause: and they are not less free from the results which are inseparable from the operation of that cause. There is no land within hundreds of miles upon which an ice-sheet of great thickness could accumulate: and upon our surfaces there are no such universal marks of glaciation as such an ice-sheet must produce if it had ever invested and moved upon them.

On the other hand, we have upon those surfaces abundant marks of partial and local glaciation: and it has long been justly regarded as one of the most certain conclusions of geological science that in very recent times these islands have been exposed to a climate such as we now find only in latitudes which are arctic, or on more southern hills,—the great central ranges of Asia, Europe, and America, which, though small in area, are alpine in elevation. But the distinguishing characteristics of our glaciated rocks are: that they are very rarely such as indicate complete plastic application to the whole superficies of any rock,—that where there is the nearest approach to such complete plastic glaciation the position is such that heavy floe ice is most consistent with the effects produced,—that in the immediate neighbourhood there are always other

rocks which have not been touched at all,—that, generally, even those which have been smoothed, have been smoothed on one side only, and are left rough upon another,—that the tops of ridges, and sometimes the summits of a range, are thus often glaciated on one side only; and finally, that the distribution of transported boulders, resting specially on projecting knolls and the tops of hills, do not indicate an investing sheet, but transport on ice-rafts, and deposition by them on the spots where those rafts grounded, as upon submarine rocks and shoals, and where they ultimately melted, leaving their stony burdens as the lasting memorials of their voyage and of their shipwreck. We have only to read the account given of heavy pack-ice by our searchers for Sir John Franklin when they wintered on the edge of the Polar, or as they called it, the Palæocrystic Sea, to be convinced that such ice, when it attains a great thickness, and is impelled by powerful tides and currents, is competent to effect even far more intense glaciation than that of which we have any evidence in our islands. On the other hand, we have only to look at those of our shores and hills which are most glaciated to see that the glaciation is everywhere very partial—affecting only surfaces which are exposed in some one particular direction, and leaving innumerable other surfaces, which are sheltered from that direction, entirely untouched. This is not the place to enter upon the details of an argument which is purely geological, and therefore I shall content myself with saying, that a long study of, and a constant residence among, hill surfaces which exhibit every British form of glaciation, have convinced me that every one of these forms are to be accounted for, either by common small local glaciers following the contours of the existing hills and valleys, or else by floating ice grounding on our hill-tops and lower ridges, during a submergence of the land under a glacial sea to the depth of at least 2000 feet. During that submergence, when completed, and during the process of sinking, large surfaces would always be sheltered from the impact of floe-ice, and the total absence of its work from large areas of the country, where it appears abundantly at certain points, is therefore a phenomenon which involves no difficulty. Not only are all the facts consistent with this explanation, but I venture to think they are not consistent with any other.

It has long struck me as one of the most curious circumstances connected with geological science, that this idea of a great and a very recent submergence of our northern hemisphere to some such depth as 2000 feet during the glacial epoch, although not by any means universally admitted, has yet been widely suggested, and even continually assumed without all its necessary consequences having been fully realised. There has been, I think, a sort of unconscious disposition in all of us to avoid looking it in the face. I do not mean that we are consciously dishonest with ourselves or others. It is not that we wish deliberately to suppress facts in order to maintain a theory. It is simply that an incongruous fact is a trouble to us—an embarrassment—from which we are apt to avert our eyes. And no wonder, for there are sometimes in nature and in science certain single facts, which, when certain, definite, and clearly understood, are strong enough to bear the weight of the most formidable conclusions. They are like the footprint on the sand

in the story of Robinson Crusoe. Such are the facts which indicate in our country a great and a recent submergence under the sea. Corroborative facts of the most striking kind have had other explanations imposed upon them, which would never have been thought of for a moment if this one had been admitted as ready to our hand. I will take one example. Near the top of a mountain in North Wales—part of the Snowdon range—about 1150 feet above the level of our present sea, there has long—ever since 1831—been known to exist a thick bed of marine gravel, full of shells of no less than twenty-seven species of one family and twenty-eight of another, all of living forms—this bed being capped and protected from denudation by another bed of glacial clay.[1] There is nothing surprising in this fact if North Wales was within the area of the great northern submergence. But if any such submergence is as yet an undigested idea in our accepted geological teaching—if such a fact is not easily assimilated with current preconceptions, this Moel Tryfan shell gravel, 1150 feet above the sea, is an uncomfortable fact, of which the less is said the better. A few desperate attempts have been lately made to account for it by some form or another of the Protean ice-cap theory—under which ice in some great moving mass is made to carry by escalade the highest summits of the land, and in this case to lift, as by a mighty ploughshare, the gathered gravels of the sea, and to push them up before its advancing front to the top where they are now found.

So again with the distribution of other gravels, destitute of organic remains, as that distribution has been traced not only all over these Islands, but over a large portion of the world. For a long time it was always assumed that these gravels must be attributed to our existing rivers, or lines of drainage, when those rivers ran at levels several hundred feet above their existing channels. But during later years facts have been accumulating to show that at least some of those gravels are above the watersheds of our existing drainage, and can be traced on areas to which they cannot have been carried by any river. I have myself examined beds of high level gravels, composed of well-rounded stones and pebbles, lying completely above the valley of the Thames, and composed mainly of materials which must have come from a great distance across England, probably from Wales. Here, again, there is no difficulty—if a submergence be admitted during the glacial age. But I do not observe that this explanation is generally given, although without it the phenomena seem to me to be altogether unaccountable. So again, going much farther off than our own islands, immense accumulations of superficial gravel were noted by Darwin all over the Pampas of the South American continent. He saw the difficulties they presented, and observed upon the universality of similar facts over the whole globe. Nowhere, apparently, are masses of superficial gravel so striking a feature in the landscape as on the lofty plateaus of Thibet, which occupy some of the highest levels of the Indo-European continent. Then we have to deal with the not less impressive facts connected with the destruction and entombment of the great quaternary mammalia,—with their wide-

[1] *Memoirs of the Geological Survey*, vol. iii. pp. 276-8.

spread scattering over the soil of the Pampas,—with their crowded remains in thousands over the Siberian Tundras, and in the islands of the Siberian Sea,—with their occasional concentration in caves, where they are sometimes so packed together as to fill the whole available space from floor to roof,—with the famous fact that some of these great beasts have been frozen up in the flesh, and preserved to our own time as fresh as frozen meat in the winters of Canada, or in the refrigerators of ocean-steamers,—with the apparent conclusion that these creatures must have been suddenly enveloped in a degree of cold in which it is difficult, if not impossible, to suppose that they could have previously lived.[1]

I do not mean to represent it as in the least degree surprising that there should be a great indisposition to combine these facts and focus them into some consistent and intelligible theory in explanation of them. The question is beset by that kind of difficulty which consists in the wide acceptance of certain preconceived ideas. There is a certain natural languor which besets us under such conditions. We are glad to postpone the problem, rather than face even obvious conclusions which are not only unfamiliar, but are destructive of conceptions which have been long assumed to be almost a part of science. The continuity of causes has been carelessly and passively admitted to involve the uniformity of effects. This has been only a natural reaction against the old facile recourse to imaginary convulsions. Our illustrious countryman Hutton, with Playfair as his most classical exponent, and Lyell as his most powerful and systematic teacher, have had such a predominant influence on the scientific imagination, that we have been most naturally shy of even approaching such an idea as that of a great submergence of the land, involving as it does a still later movement of emergence, or rising again from a submerged condition. Moreover, this sense of what may almost be called a scare is intensified by the feeling that if such movements have taken place at all in connection with the glacial age, they must have been very recent—so recent as to be among the very last and latest causes moulding the world in which we live. If the great perched boulders which sit on the very tops of many of the hills—as around my own residence on Loch Fyne—if the masses of broken rock which lie stranded on the face of some projecting promontories like the planks and fragments of some shipwrecked vessel, have indeed been brought there by floating rafts of ice, then it is certain that this operation has been performed, as it were, the day before yesterday in the weeks and years of geological time. The surfaces on which those boulders rest have been apparently unchanged since this burden was dropped upon them. The finest lines—some of them as fine as a hair—produced by glacial scratching have suffered no obliteration, defacement, or even shallowing. They are often as sharp cut as on the day after the ice files were applied. The shells of Moel Tryfan—all of living species—tell the same tale. It is our own existing sea, with its still living fauna, that has surged round the high shoulders of Snowdon, and left its lifted gravels on

[1] The facts connected with this subject have been well presented in Mr. Howorth's work on the Mammoth Age.

the top of Moel Tryfan. This belongs to that class of facts, one single example of which is enough to support the most certain and the most sweeping conclusions. But it is not a single fact. It is one of a series which compel us, as it seems to me, to admit the very recent occurrence of physical changes in the distribution of sea and land, which converts our existing geography into a thing of yesterday. But more than this—a mere change from a temperate climate to an arctic climate may possibly be due, as it has actually been attributed, to cosmic causes, and to these alone. I am myself somewhat sceptical as to their application, even to changes of mere temperature, so great and so comparatively recent as the glacial age appears to have been. But, however this may be, it is certain that the same causes cannot account for submergences and re-elevations of the land, such as the glacial phenomena and the distribution of gravels, seem to indicate. Great changes in the distribution of land and sea are of themselves quite competent to produce great changes of climate. But the converse does not hold good. Changes of climate due to cosmic causes would have no effect, so far as we know, upon the distribution of land and sea. Greenland again is a case in point. It is in the highest degree improbable that when Greenland was covered with the vegetation of the coal, or when, at a later time, it supported the forests of the Eocene or the Miocene age, it was either itself of its present mountainous elevation, or that it was in its surroundings, as it now is, inaccessible to the free access of warm equatorial oceanic currents. The geological history of Greenland, therefore, is above that of all other countries, an index and a proof of a geography which has, in very recent times, been profoundly changed. Mathematicians tell us that its position with reference to the pole cannot have been altered. Botanists tell us that plants would not be killed by six months or more of darkness, provided the temperature were high and the climate humid. But this would imply the absence of the North American continent, or at least of a great part of it, and an open passage for the warm waters of the Pacific to Greenland and the circumpolar archipelago. An equal submergence and suppression of a great part of the European continent during the same epochs seems demanded by well-established geological evidence. This again involves a complete reconstruction of the map of our northern hemisphere. I know of only one method of meeting this difficulty, and that is to reflect how much of it lies in our own preconceptions as to the improbability of such changes, together with our profound ignorance of the causes by which they are brought about. We know that the distribution of land and sea has been constantly changing during the past history of our planet, and the assumption that it cannot have done so very lately, or to any very great extent, is an assumption for which we have not the smallest ground in reason. We have good reason to believe that subsidences and elevations of the land are going on now very slowly at several places—Greenland itself being one of them. Dr. Kane tells us that from some undetermined point north of the 76th parallel of latitude Greenland is now rising so rapidly, that some points of the coast exhibit the steps of elevation in successive terraces, which at once catch the eye and arrest attention. At

one place he counted forty-one of these imposing terraces, leading at the highest to an elevation of 480 feet.[1] Our own coast-line has visibly changed all along our western coast by a movement of elevation since the glacial epoch. On the western shores of the island of Jura there is a long continuous line of old sea-beach so recent that the rolled stones of which it is composed have had no time to gather upon them even moss or grass, and are disposed as the surf left them at some date which is unknown, but which cannot be other than extremely modern. This sea-beach rises, I believe, to 160 feet above the present level of the ocean. We, as geographers, must know—small as this elevation is—what a tremendous difference it would make in the map of Europe if it were universal. We have no knowledge how such an elevation of the land can have been effected, nor can we have any *a priori* reason to suppose that the same cause might not produce elevations and depressions much larger in extent. Recent researches by Professor George Darwin and others, have now revealed the fact that the crust of the globe is in a state of continual vibration. It seems to be as sensitive as if it were a jelly. The moment we get this idea firmly grasped, we must feel that waves of movement are easily conceivable which would be really very small, but which to us would seem, and in their effects on the habitable world would really be, tremendous. For here we come upon one of the most deceiving of all our prepossessions, and that is the prepossession which consists in all our standards of magnitude. Elevations and depressions which are really of infinitesimal smallness on the scale of our globe are habitually regarded by us as of stupendous magnitude. The highest mountains on our planet are in reality so small that when drawn to scale upon the curvature of the earth they are seen to be less than the wrinkles on the skin of an orange. The truth is that when we look upon a globe drawn to such a scale, the only difficulty we shall experience is to imagine any internal movement of any kind which could possibly be so trifling in its results upon the surface as to be measured by a maximum variation in height and hollow of some 60,000 feet. Above all, we must get rid of the prepossession that slowly operating causes can never produce sudden results. This is against all reason and all experience. Molecular changes of infinite fineness and of great slowness are constantly in our existing world, culminating at last in sudden changes of comparatively large extent, which we in our littleness may think of and speak of as catastrophes. When we have made ourselves thoroughly familiar with this conception of mere scale, we shall walk upon the border-lands between Geology and Geography with a more intelligent and a firmer step. And it will be with no surprise and with no presumption of incredulity that we shall recognise the many combining and concurring facts which point to the conclusion that some of the greatest changes which our world has seen have been amongst the number of those which have ushered in the conditions under which we now live. Some of the most unaccountable of these, we have now good scientific reason to believe, have happened since the birth of man, and can be shown to stand between us and the earliest progenitors of our race.

[1] Kane's *Arctic Explorations*, p. 316.

# THE VERTICAL RELIEF OF THE GLOBE

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(*With a Map.*)

In attempting to form in the mind, and still more in endeavouring to set before a popular audience, a vivid conception of the inequalities on the earth's surface, which have called the science of geography into existence, a difficulty is felt akin to that of an observer on Ben Nevis describing the surrounding country to a tourist while a thick mist rolls a dense veil across the lower slopes and valleys. The veil interposed to obscure our view of the world is the ocean, which conceals nearly three-quarters of our planet. Apart from the undue prominence given to the distinction between land and sea, the intelligent and logical study of physical geography is retarded by the difficulty of level and relative height which the ocean surface introduces.

The diversity of mean sea-level in different parts of the United Kingdom is sufficient, in the case of flat shores, to affect the local value of the large-scale Ordnance Survey maps; while the possible difference of elevation of the sea-surface in the centre and on the eastern shores of the Pacific has been estimated at more than 2000 feet. To appreciate fully the vertical relief of the globe, the physical geographer would require to produce a map the contour lines on which would represent the intersection of equidistant shells concentric with the planet and similar to it in form. A simpler case would be to contour the earth's surface at intervals of uniform distance from the centre, *i.e.* the intersections of concentric spherical shells, but by this proceeding the form of the geoid would obscure its superficial irregularities, on which, and not on the degree of polar flattening or equatorial ellipticity, the diversities of land and water depend.

The structure of the earth is stated most simply by describing it as an irregular stony ball, covered with an ocean of sea-water, and a more extensive envelope of air. I believe that to Mr. Mackinder, Reader in Geography at Oxford, is due the credit of introducing into English writing the simple and suggestive terms *Lithosphere* and *Hydrosphere*, which denote the solid and liquid portions of the earth, as *Atmosphere* expresses the gaseous. The terms have been used in Germany for some time, and deserve to obtain wide currency amongst physical geographers.

If the lithosphere were perfectly smooth and at rest, with the hydrosphere uniformly spread over its surface, the former would have the form of the geoid or terrestrial spheroid, and the latter would surround it to a depth of 1·7 miles. The surface of this hypothetical lithosphere may be termed the mean level of the solid spheroid, or shortly *mean sphere level*, and this surface presents certain advantages as a standard level. In reality the surface of the lithosphere is not smooth; parts of it are much depressed, and other parts ridged up until they project beyond the hydro-

sphere. These projecting ridge-tops form the land of the earth, and the area of dry land obviously depends on the volume of the hydrosphere, the configuration of the heights and hollows, and to a slight extent on the balance between evaporation and condensation.

In order to determine how great are the heights and hollows of the lithosphere, accurate surveys of all the land and sea of the globe are necessary. Since large tracts exist in the Arctic regions and far wider regions in the Antarctic concerning which we know absolutely nothing, and since only a few countries and no oceans have been surveyed in minute detail, it is obviously impossible to obtain correct data to warrant an exhaustive treatment of vertical relief. An approximation may be made, however, by the use of Dr. John Murray's very careful estimates of the height of land and depth of sea,[1] from which the position of mean sphere level can be calculated, subject to the uncertainties referred to above. In a previous paper[2] he gives a calculation by Professor Chrystal of the area of the terrestrial spheroid as, in round numbers, 196,900,000 square miles, of which he assigns 55,000,000 square miles to land and the remaining 141,900,000 to sea-surface. In the paper on heights and depths the same area of land is assumed, but only 137,000,000 square miles of sea are considered in arriving at the estimate of average depth. The depth of ocean surrounding the smoothed lithosphere is given as about two miles; but if the total volume be 323,800,000 cubic miles as stated, the depth can only be 1·6 miles. Dr. Murray informs me that the discrepancy in areas is due to instrumental errors in measuring, which, when duly allowed for, leave the mean depth of the whole water surface of 141,900,000 square miles as 2·36 miles; the volume must thus be 334,900,000 cubic miles, which would cover the smoothed lithosphere to a depth of 1·7 miles, assuming that the lithosphere is a spheroid whose mean diameter is 3½ miles less than that of the actual terrestrial spheroid, hydrosphere included. The superficial area of the lithosphere would thus be 196,600,000 miles nearly; the mean surface of 196,700,000 square miles may be safely used.

The data available for calculating the position of mean sphere level are:—

Average depth of oceans = 2·36 miles or 12,600 feet, or 2100 fathoms.
Average height of land = 0·426 mile or 2250 feet.
Average thickness of hydrosphere surrounding smoothed lithosphere = 1·7 miles or 8980 feet.
Area of land = 55,000,000 square miles.
Area of oceans = 141,700,000 square miles.

The average depth of ocean being calculated from its area, and the volume obtained by calibration of the depressions is theoretically free from error due to the heaping up of the sea against the land ridges by attraction; this error affects the mean height of the land, but probably to an extent sufficiently small to ignore at present. The criticisms of Penck

[1] *Scot. Geog. Mag.* iv. 1 (1888). [2] *Ibid.* ii. 550 (1886).

and Supan[1] may also be ignored, for with so great uncertainty as is introduced by the unknown Antarctic region the addition or subtraction of even a few hundred feet of height or depth in the case of individual continents and oceans becomes negligible in a general discussion, and Dr. Murray's corrected results referred to above rectify many of the discrepancies detected by the German critics.

As a first step in the calculation, suppose a block of 55,000,000 square miles area and 1·7 miles deep to be cut out of the smoothed lithosphere and set down on the surface alongside the depression (*see Diagram*). Assuming the lithosphere to be rigid and incompressible, no change will take place in the surface of the hydrosphere, as the hollow is exactly equal in volume to the block set down on the surface. The sides of the block and hollow may be assumed as perpendicular to the mean lithosphere surface; in other words, the arc subtending the same angle at the earth's centre is for the present purpose not appreciably greater for a radius increased by 3·4 miles.

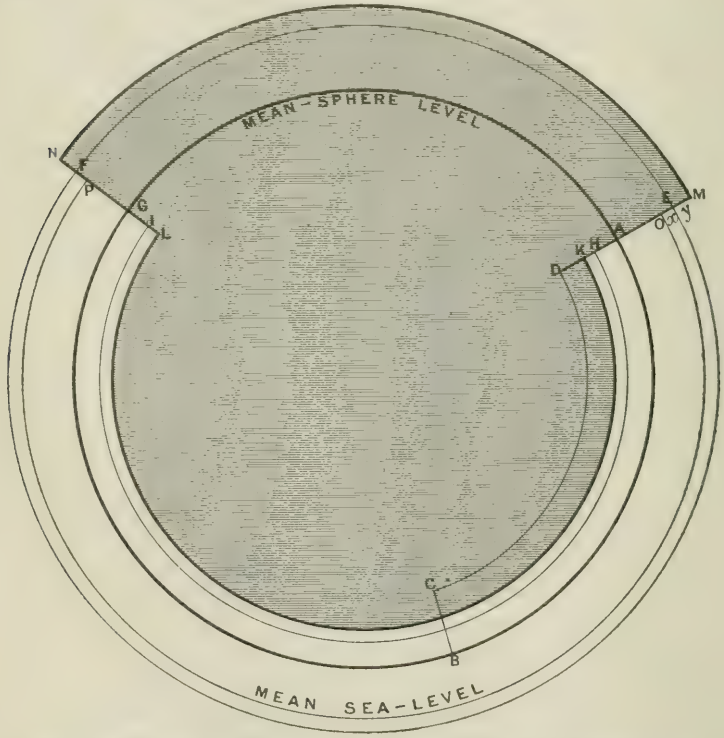


DIAGRAM ILLUSTRATING THE CALCULATION OF MEAN SPHERE LEVEL.

A B G, surface of lithosphere unruffled by elevations or depressions, forming mean sphere level.
E F, surface of hydrosphere entirely surrounding smoothed lithosphere.
A B C D, depression 55,000,000 square miles in area and 1·7 miles deep.
A E F G, elevation excavated from the depression and piled on an equal area of the lithosphere surface. H I, the equalised bed of the depression. H K L I, additional excavation to furnish material E M N F, to complete continental mass. O P, mean sea-level. K L, mean bed of oceans. M N, mean continental surfaces.

[1] *Scot. Geog. Mag.* v. 412 (1889).

Next, if the surface of the 141,700,000 square miles of lithosphere surrounding the elevated tract were reduced to uniformity, the whole depressed area would lie 0·66 mile beneath mean sphere level, and the hydrosphere surface being still undisturbed its mean depth would become 2·36 miles, which is the average depth of the actual ocean. All further transferences of matter from the bed of the ocean to the surface of the land must be carried out without disturbing either this depth or the area it covers.

In order to raise the land to its actual mean level above the hydrosphere surface, a sufficient quantity of matter must be removed from the depressed area, and its removal will, of course, lower the hydrosphere level by a certain amount. Suppose the necessary quantity is obtained by removing a layer $x$ miles thick from the 141,700,000 square miles of the depressed area; in consequence the hydrosphere surface sinks $x$ miles as its depth remains unchanged, and $x$ miles of the land block project above the surface. When the matter removed from the depression is piled up uniformly on the 55,000,000 square miles of elevation it forms a layer $y$ miles thick; and $x + y$ is the height of the land above the actual hydrosphere level, supposing the latter to be undistorted by the attraction of the land. The data quoted above enable us to frame the simultaneous equations—

$$x + y - 0{\cdot}426 = 0$$
$$\text{and } 141{\cdot}7\,x - 55\,y = 0$$
$$\text{which give } x = 0{\cdot}120 \text{ and } y = 0{\cdot}306 \text{ in miles.}$$

The average height of the land above mean sphere level is thus $1{\cdot}70 + 0{\cdot}306 = 2{\cdot}006$ miles or 10,590 feet, and the average depth of the depressed portion beneath mean sphere level is $0{\cdot}66 + 0{\cdot}12 = 0{\cdot}78$ mile—*i.e.* 4100 feet or 680 fathoms. Since the hydrosphere is 2·36 miles thick its surface stands 1·58 miles, or 8400 feet or 1400 fathoms above mean sphere level.

The result of excavating from beneath mean sphere level, and piling up above mean sphere level, is the same as that of the process which actually took place when the vertical relief of the earth's surface was produced by depressions and simultaneous upheavals. It is true that as the earth cooled and solidified from the state of a plastic spheroid, that could not perpetuate the temporary disturbances of its surface, its diameter became less by contraction, and the surface features were, age after age, crowded into a smaller and smaller superficial area, the tangential stresses so produced gradually increasing the diversity of ridge and hollow. It is convenient to separate the two processes in thought. Let the lithosphere cool and contract unruffled to its present dimensions, and suppose the hydrosphere absent, then let the present vertical relief come suddenly into existence by the depression of one half of the superficial area and the simultaneous elevation of the other half. Here we cease to deal with one perpendicular-walled block of elevation in the midst of a uniform depression, and come to the consideration of numerous ridges and hollows, which graduate by more or less gentle slopes into each other. The line separating all the elevations from their associated depressions

divides the surface of the earth into two parts, unsymmetrically distributed but equal in area, and this line is the contour-line of mean sphere level.

Mr. Bartholomew has prepared the accompanying map of the world on an equal-area projection, contoured at equal intervals, from the bed of the deepest depression upwards, and coloured to show the vertical relief of the globe, the hydrosphere being supposed absent. The strong dotted line (corresponding to a depth of 1400 fathoms below "sea-level") shows the mean sphere level. This map, representing vertical relief and nothing else, recalls, especially by the Pacific hemisphere, the appearance of the moon seen through a telescope of moderate power.

The map shows the general character of the vertical relief to be produced by a vast three-armed depression, surrounding a small elevated area about the south pole, and spreading northward, and a great elevation surrounding the north pole, and spreading southward in three world-ridges. Both regions are comparatively flat. The world hollows extend for millions of square miles in gently undulating plains, broken here and there by depressions of considerable depth but small area, and here and there by abrupt elevations of still less extent. The world-ridges are also generally speaking flat or terraced, rarely broken by deep depressions, but in many places traversed by narrow lines along which a much greater height is attained. The loftiest summit (Mount Everest) towers 37,400 feet above mean sphere level, the deepest depression (in Tuscarora Deep, off the north-east coast of Japan, also in a small depression near the Fiji Islands) sinks only 21,600 feet beneath it. The contrast in configuration is complete between the narrow, sharp, lofty crests of the world-ridges, and the broad, flat, shallow troughs of the world-hollows. The two are separated by a slope which is everywhere steep, and in some places almost precipitous. This fact is indicated by the manner in which all the contour-lines trace out similar outlines for the world-ridges, and by the closeness with which the lines follow each other on the slope. At the top the edges of the world-ridges are so flattened that 24,000,000 square miles are comprised in the vertical rise of 1200 feet or so between the end of the steep slope up from the depressed area and the beginning of the steep slope up to the loftiest set of plateaux. The actual sea-coast lies midway on this gentle slope which has probably been largely produced by wave-action, and it is significant that the coast-line should occupy just that position on the world-ridges where a given rise or fall in the level of the hydrosphere would cover or lay bare the greatest possible extent of land.

Mean sphere level divides the surface of the globe into two regions—a region of depression and a region of elevation, and these are of equal area. In his lecture on the Great Ocean Basins,[1] Dr. Murray divided the earth's surface into three areas: Abysmal, including all deeper than "about 1000 fathoms" beneath sea-level; Transitional, from about 1000 fathoms to sea-level; and Continental or land. These three areas represent regions of distinct physical differences, and if, instead of the vague

[1] *Nature*, xxxii, 581 (1885).

arbitrary boundary of about 1000 fathoms, we use the mean sphere level of 1400 fathoms below sea-level, the limits of these areas may be re-stated thus :—

*Abysmal Area*, occupying all the depressions beneath the mean surface of the lithosphere, 98,450,000 square miles or 50 per cent. of the earth's surface.

*Transitional Area*, comprising all the region above mean sphere level covered by the hydrosphere, 43,450,000 square miles, or 22 per cent. of the surface.

*Continental Area*, all the lithosphere that projects beyond the hydrosphere, 55,000,000 square miles, or 28 per cent. of the surface.

My object in this brief paper is merely to indicate a simple and satisfactory basis on which to construct the superstructure of physical geography, not by any means to attempt a description of the distribution and varieties of Vertical Relief.

## SOUTHERN CALIFORNIA: PAST AND PRESENT.

By Professor W. G. Blaikie, D.D., LL.D., Edinburgh.

Properly speaking there are three Californias—Northern and Southern California, which constitute the American State, and the peninsula of Lower California, which still retains its connection with Mexico. It is with Northern California that we are most familiar; the southern part of the State—very likely at no distant day to become a State itself—has as yet hardly impressed itself on our minds as a separate entity. What brought the north so suddenly into prominence, as all the world knows, was the discovery of gold the year after it was sold to America; the "ugly rush" became historical, and impressed on the new Pacific State the features that for a long time were associated with the name California. Many of us used to think of California gold-diggers as the wildest and most reckless of men, going about with a revolver in one hand and a bowie-knife in the other; while San Francisco—the sudden creation of the gold discovery—loomed in the distance as a kind of pandemonium, where life was never safe and the most shocking tragedies were enacted on the streets in the full light of day. This was, of course, a great exaggeration; the exaggeration to which we are so prone when we ascribe to a whole community the outstanding features of a part. But Northern California has now settled down to about the level of the other new States of the West, and though it has not got rid of all its rowdyism, it numbers among its people many of the excellent of the earth.

Southern California, embracing about 200 miles of the State, extending

southwards,[1] has had a different modern history. Its settlement by Americans did not begin in earnest till about twenty years ago. Though there is gold in it, it was not gold that made its fortune, but its climate and its fruit. Nominally it ceased to be Mexican and became American at the same time as the northern part of the State, that is to say in the year 1848; but as the treaty with Mexico provided that the Mexicans (a sort of mixed race of Indians and Spaniards) should continue to possess their lands, there was at first no great inducement for Americans to attempt to settle. A few, however, came, and became owners of large tracts, which they acquired at a very small cost. The Mexicans were at best but a feeble people, and when the country was no longer ruled by their Government they were not much disposed to remain in it. Many large ranches were sold by them to Americans for less than a dollar an acre. Great tracts of these ranches have been sold within the last few years for at least a hundred times as much, bringing to their owners almost fabulous wealth. These large ranches were employed by the Mexicans for rearing sheep, cattle, and horses, and for the most part they were put to the same uses by their American successors. The Americans have been accused of the greatest harshness, even of murder and robbery, in evicting the Mexicans and taking possession of their lands. A well-known writer, Helen Jackson, in a clever novel, *Ramona*, has drawn the original inhabitants as saints and heroes, and the American interlopers as knaves and ruffians. It is not easy to say how much truth there may be in this representation, or whether, on the other hand, the imputation of such vices to the Americans may not have arisen from the fact that the Mexican properties were often mortgaged, and that when, on the mortgages foreclosing, Americans took possession, they were branded by the popular voice as thieves and robbers.

To a great extent Southern California became what it was in Mexican hands through the labours of the "Mission Fathers," whose establishments were first organised over the country in the course of the eighteenth century. Planted originally by the Jesuits, these missions were transferred to the Franciscans on the expulsion of the Jesuits from Spain. Their purpose was the conversion of the natives to the faith and practices of the Catholic Church, and as the natives had little or no religion of their own, the missions ere long acquired a thorough ascendency over most of the population. The names of these missions—San Diego, San Gabriel, Santa Barbara, and the like—still remain. The fathers did what

[1] Southern California consists of seven counties, of which the areas and estimated population in 1888 were as follows:—

| | Sq. Miles. | Population. |
|---|---|---|
| San Luis Obispo, | 3578 | 20,000 |
| Kern, | 8100 | 10,000 |
| Santa Barbara, | 2265 | 25,000 |
| Ventura, | 1682 | 12,000 |
| Los Angeles, | 4812 | 165,000 |
| San Bernardino, | 21,171 | 30,000 |
| San Diego, | 14,968 | 50,000 |
| Total, | 56,576 | 312,000 |

In June 1889 Los Angeles county was divided into two, Los Angeles and Orange.

they could to improve the agriculture of the district, and they introduced the culture of the vine and other fruit-trees. What is called "the mission vine" produces a choice species of grape, but unfortunately it has recently become the subject of a blight that seems not unlikely to exterminate it. The ups and downs of the Mexican State necessarily affected California. In 1822, when Mexico separated from Spain, California was a province of the Mexican empire; in 1825 a territory of the Mexican republic. The Mexican revolutions had another effect: much of the property of the missions was secularised by the Mexican Government, and the Church was stript of a great part of its wealth. Happily it was before the time of the American occupation that this took place; it was no Protestant that played this game with the Church possessions of California.

It was about the year 1866 that the first "boom" took place in the value of real estate, and settlers began to be attracted in considerable numbers to Southern California. The views of settlers had been turned in the first instance to the raising of stock; but at the same time the wonderful capacity of the country as a fruit-growing region intensified the sense of its value, and drew toward it a new class of settlers. Climate and soil alike favour the fruit-producing industry. It is hardly possible to exaggerate the qualities of the climate. During the summer half of the year, no rain falls except as a rare phenomenon; while in winter, when rain does fall it generally falls heavily, and that mostly at night. A return for Los Angeles, the capital, where the rainfall is considerably higher than at other places, gives 180 days in the year as absolutely clear, 137 as fair, and only 48 as cloudy.

The present writer spent the entire months of June and July 1889 in Southern California without experiencing a single day when there was not the most balmy and delightful sunshine. The temperature is often pretty high—between 80° and 90°, but in the neighbourhood of the sea it is tempered by a delightful sea-breeze which seems to make the heat absolutely harmless. It is often remarked that no case of sunstroke has occurred in California, and no case of dog-madness. More than that, people are able to work in the open air without injury at a temperature that could not be endured elsewhere. The present writer found to his surprise that in the very heat of a summer day he was able to take considerable walks over the fields and roads, not only without fatigue, but with something of that sense of invigoration which one has on the mountains of Switzerland. The summer mornings and evenings are especially delightful. The sunset is seldom gorgeous, as in cloudy regions, but the horizon burns with a rich orange hue that sends a glow over the mountains, and lights up sea and land and sky with a wonderfully pure and mellow glory. Very beautifully do the tall eucalyptus and the graceful hanging pepper trees stand up against the evening sky.

As a small set-off to this, we must mention an evening and morning fog, which steals up from the sea, but is soon scattered by the morning sun. It is, of course, most marked in the neighbourhood of the sea; further inland and in higher regions it is not experienced. In some degree it may be unfavourable to health; it slightly retards the ripening

of fruit, and it makes such places less suitable for the *drying* of fruit—at least in the open air.

But it is for its winter that the climate of Southern California deserves to be spoken of in the superlative degree. Except when rain falls, there is hardly less sunshine than in summer. Nor is there much less heat by day. The nights are decidedly colder; the days do not differ much from summer days. It is this all but equality of temperature in winter and in summer that is giving South California such a character as a health-resort. For diseases of the lungs and of the throat it is unsurpassed by any country. The instances are very rare in which persons so affected have not enjoyed in Southern California a marvellous degree of health. Some have arrived after the disease had advanced too far; but for the earlier stages of such ailments the climate seems to work like a charm. One wonders to see how many medical men there are in this region of health; the answer one gets to one's inquiry on the subject is, that they themselves were ill when they came out, but that having recovered, they try to maintain themselves by practice.

And it is not merely invalids that like the Californian winter. The number of Americans is legion who get very tired of the severe winter in the Eastern and Northern States. If they have means and leisure they are very fond of taking a winter in Southern California. And the experience of one winter makes them exceedingly reluctant to go back into the cold of the east or the north. In this experience, Canadians are at one with Americans of the States. A very large number of persons from these parts have in this way been drawn to California. And this attraction can never pass away. A young man of our acquaintance from Pennsylvania afflicted with asthma, who might have succeeded at home to his father's lucrative business, went to Los Angeles in the hope of being benefited by the climate; and when he thought himself cured returned to Pennsylvania, but only to be plunged the very first night, and every other night he remained, into his old ailment in its very worst form. There was nothing for it but renounce his father's business, and try to make a living, however humble, in the genial air of California. Whatever other attractions may help to draw people to this region it seems certain to enjoy a perpetual renown as a sanitarium; and as those who have experienced its worth spread their knowledge among their acquaintances, there will for a long time be a rapidly growing number of persons eager to try its quality.[1]

It is easy to see how a climate so constantly balmy and sunny must be admirably adapted for fruit. And, indeed, there is hardly any kind of sub-tropical fruit that may not be easily raised in great abundance. Oranges, lemons, grapes, apricots, nectarines, quinces, plums, figs, walnuts, olives, pomegranates, limes, as well as more common kinds, apples, pears,

[1] The death-rate of San Francisco, 13·73 per 1000 inhabitants is the smallest of any large city in the United States. Owing to rapidly advancing population, and likewise the influx of invalids, it is not possible to give with precision the death-rate of Los Angeles. In the *Los Angeles Illustrated Herald* for 1889, it is stated to be 8 per thousand, but this is so low a rate, and rests so much on hypothetical data, that it cannot be considered authentic. There can be no doubt, however, that the rate is very low.

melons, raspberries, strawberries, etc., flourish in almost every situation, but of course not equally. It is one of the points that have yet for the most part to be settled by experience what fruits grow best in particular localities. Some progress has been made in determining this; there are localities known to be pre-eminently favourable to deciduous, and others to citrous fruits; but much has yet to be done in mapping out the capabilities of different regions. Whether the flavour of Californian fruit be in all cases equal to that of some other kinds will be questioned by some; Scotsmen will say without hesitation that the strawberry is not equal to that of Aberdeenshire; and with others the Florida orange will carry the day over that of the Pacific coast. Be that as it may the quality as well as the quantity of the fruit is excellent, and it will always command a high place in the market. And if abundance of wholesome fruit as an element of diet be favourable to health and longevity, the inhabitants of Southern California will always be in full possession of that means of augmenting the felicity and prosperity of life.

The soil of the country is about equally favourable with its climate to the growth of fruit. Southern California has several ranges of mountains, including the Sierra Nevada, the Sierra Madre, and the coast range. Between these mountains lie the valleys which form not only the agricultural but also the horticultural regions. The mountains themselves have as yet been turned to little or no use, although the time will probably come when they will be made use of for timber, for pasture, and on their lower flanks for crops. There is such abundance of rich land in the valleys that the mountains must bide their time. Most of the valleys seem to have been the beds of ancient lakes, into which the vegetable matter from the mountains was washed, and so deposited as to form a soil of unexampled richness and abundance. Of course it is not all of equal quality. Some of it is sandy and barren. Some of it is impregnated with alkali, and therefore unproductive. Some of it is mixed with clay, the "adobé" of the natives, furnishing material for their adobé houses. But a very large portion is like the finest garden mould, pulverised like mole heaps, easily ploughed, easily worked, and of almost unexampled fertility. There are places where this rich mould is of immense thickness, some say hundreds of feet. It is no uncommon thing, where the remains of an ancient "wash" or river channel have ploughed up the soil, to observe a bank of vegetable mould twelve or fifteen feet in thickness. The resources of such a soil are almost exhaustless. Where irrigation is applied, it is easy to get two crops in the year of any kind of farm produce. Alfalfa, a kind of clover, known at home as Lucerne, may thus produce eight crops in a season. In the nature of things this productiveness must one day come to a close, but no appreciable difference in the capacity of the soil has yet been discovered, although crop after crop has been taken from it without the use of manure.

This remarkable soil is favourable in many ways to the growth of fruit. The roots spread out freely, finding nourishment everywhere, and they penetrate deeply for the same reason. And in this way they get

the benefit of the water supply, which, as we shall see presently, is often considerably below the surface. In other ways the marvellous qualities of the soil are abundantly apparent. One of the most striking proofs of it is the rapid growth of trees. The most common trees are the eucalyptus or gum tree, in its two varieties, blue gum and red gum, and the pepper tree. The eucalyptus makes a growth of 8 or 10 feet a season. In five or six years it is a tall, handsome tree of 40 or 50 feet. The pepper tree does not grow so tall, but it is more bushy, and its hanging festoons make it more ornamental. A settler planting some of these trees in the very heart of a wilderness is in possession of a clothed and cosy domain in three years, with timber as well grown as it would be in twenty years in most countries. The growth of shrubs and flowers is on a corresponding scale. A friend of mine at Santa Monica told me that after the rain set in he measured the growth of a creeper in his garden, and found that in four-and-twenty hours it had made 10 inches. If you stick a sprig of marguerite in a corner of your garden, it will grow to the size of a gooseberry bush, covered with thousands of flowers. Geraniums grow, almost as a weed, to the size of shrubs, and are one blaze of blossom, large and brilliant. Roses flower all the year round. In uncultivated ground many species of natural flowers, that we have to rear with the greatest care, flourish in rank luxuriance. Wild mustard fulfils the conditions of the parable in Scripture, and is both a beauty and a nuisance. Here is a description of it from *Ramona*: "Coming up out of the earth so slender a stem that dozens can find starting-point in an inch, it darts up, a slender, straight shoot, five, ten, twenty feet, with hundreds of fine feathery branches locking and interlocking with all the other hundreds around it, till it is an inextricable network like lace. Then it bursts into yellow blossom still finer, more feathery and lace-like. The stems are so infinitesimally small, and of so dark a green, that at a short distance they do not show, and the cloud of blossom seems floating in the air; at times it looks like golden dust. With a clear blue sky behind it, as it is often seen, it looks like a golden snow-storm. The plant is a tyrant and a nuisance, the terror of the farmer; it takes riotous possession of a whole field in a season; once in, never out; for one plant this year, a million the next; but it is impossible to wish that the land were freed from it. Its gold is as distinct a value to the eye as the nugget gold is in the pocket."

It would be endless to speak of the flora of Southern California, or even of those specimens of it that strike the stranger, and impress him with the luxuriance of the vegetation. Let two other samples suffice. Visiting a new ranch in the valley of San Bernardino we found that the sunflower was the weed with which the farmer had chiefly to contend—covering whole acres with grand plants, that formed a vast golden blaze. Traversing the railroad in the Mojavé desert, between Sacramento and Los Angeles, we saw whole hill-sides white with the flower of the Yucca Gloriosa, the stems 12 or 15 feet in height, and the beautiful white bells hanging in massive clusters, each plant a model of symmetry. Even among the weeds by the dusty wayside you come ever and anon on some gem of white lily that might adorn the bosom of a bride, and in the

mountain thickets, convolvulus of incomparable blue and purple, cactus of peerless crimson, and annuals of such variety of form and brightness of hue that you get a new idea of the resources and prodigality of nature.[1]

But there is a set-off to all this in summer. Southern California is a contrast to most other countries in this, that it shows far best in winter. Winter is the season of greenness and freshness; in the heat of summer the mountains and the valleys, too, when in a state of nature, are withered and burnt up. In summer, although there are many elements of beauty in the country, the *tout ensemble* is not pleasing. The eye gets wearied with the great stretches of brown, withered, vegetation that present themselves everywhere, except where the land has been reclaimed by the industry of man. The mountain ranges are most picturesque, and in valleys like Santa Clara, where the ranges approach each other, the effect is remarkably fine. But mountain scenery needs two other elements to set it properly off—wood and water. It is the combination of the three that gives such an incomparable charm to Switzerland. The want of wood and water is the great drawback to Southern California scenery, especially in summer, where, in a wide landscape, there is hardly an appreciable touch of green. But in winter, after the rain, everything becomes green and bright, and in spring the blaze of colour is overwhelming. In winter most of the trees retain their foliage. Neither the eucalyptus nor the pepper-tree is deciduous, and the orange groves and olive groves are as green as ever. About the homesteads, therefore, where these trees prevail, there is none of that barrenness and death-like look which most of our woods present in winter. Snow is not known, frost only, and very rarely, at night. It is little wonder that those who have been accustomed to the long rigour of a New York or a Canadian winter find Southern California a paradise, and, once there, take for their motto, *vestigia nulla retrorsum*.

We must refer more fully now to that outstanding feature of the physical condition of Southern California—the distribution of water. The country is singularly wanting in lakes, in rivers, and even in little streams. This is not owing to the want of rain. The ordinary rainfall is not large, but it would be sufficient in ordinary soils to provide a moderate amount of running water. The following table from Government records shows the annual precipitation in Los Angeles:—

| | | | |
|---|---|---|---|
| 1878 . . . | 20·86 | 1884 . . . | 40·39 |
| 1879 . . . | 17·41 | 1885 . . . | 10·69 |
| 1880 . . . | 18·65 | 1886 . . . | 17·20 |
| 1881 . . . | 5·53 | 1887 . . . | 16·27 |
| 1882 . . . | 10·74 | 1888 . . . | 21·04 |
| 1883 . . . | 14·14 | | |

[1] A botanist quoted in *Los Angeles Illustrated Herald* (1889) says:—"The blue phacelias growing in large tracts are mistaken in the distance for lakes of water. The fleecy gnaphaliums look like lakes of silver. The golden-petalled Eschscholtzias, in compact masses of hundreds of acres, flashing back the rays of the morning sun, give the hill-slopes of the sierras the appearance of molten gold. . . . Lovingly growing together you may find gilias, calochortuses, nemophilas, collinsias, phacelias, œnotheras, bloomerias, bærias, layias, lupines, godetias, delphiniums, and many more, all on the same little half-acre."

Considering that the country is intersected by ranges of lofty mountains, one should expect in every great valley a considerable stream, fed by rivulets or runnels from all the smaller glens or cañons. But there is seldom anything of the kind. What streams there are often disappear, or shrink into mere threads, pitiable to behold. It seems to be the extremely porous nature of the soil that causes this result. It does not form a sufficiently retentive bed to retain the water. The water percolates to a greater or less depth below the surface, and finds its way to the ocean by underground channels. There is seldom much difficulty in finding water if you go deep enough for it. For ordinary purposes a sufficient supply may be found within a few feet, say from twenty to a hundred, but it needs to be pumped up, and accordingly almost every little homestead has its windmill and tank—a much neater kind of windmill than the old patterns in Yorkshire and Holland,—and there is no lack of water for the ordinary purposes of the house and the farm-yard. It is the copious underground distribution of water that causes many kinds of fruit to succeed so well. In certain situations, even in the very heart of summer, if you scratch the ground you find it moist a few inches below the surface. The moisture seems to ascend by capillary attraction from below, while the minuteness of the particles of the soil on the top seems to prevent it from escaping by evaporation.

But for many purposes a much greater supply of water is needed than can be got by ordinary means. There are some fruit trees which have to be copiously irrigated—orange trees, for example, although we believe that the opinion is beginning to be entertained that even orange trees do not need to be thus watered. And if the full benefit of the soil is to be obtained in the same season for successive crops of grass or of vegetables, abundant irrigation is required. How to provide for this irrigation is one of the great problems of Southern California. In some cases, as in certain districts near Los Angeles, sewage water is employed, but nothing can be more objectionable where the population is considerable; and, indeed, to a stranger it appears simply monstrous that in a region provided by nature with such an incomparable climate, and where from the exceeding dryness natural putrefaction is unknown, a contaminated atmosphere should be created and fever-breeding effluvia put in circulation simply through greed—in order to increase the revenue of dollars from ground already abundantly productive. Artesian wells is another device for getting a copious supply. Many of these are now scattered over the country, penetrating to depths of from 100 to 1000 feet or more. The attempt to bore deep enough has sometimes had to be abandoned, and it cannot be reckoned on to succeed in every district. But where it has proved successful, a constant rush of water is the result, capable of being carried by ditches and smaller channels over a considerable surface, and abundantly repaying the cost, sometimes very heavy, at which it has been constructed.

Notwithstanding these methods, great tracts of fertile soil in the valleys of Southern California are at this moment a mere desolation for want of water. The authorities, both in this State and in other States where the same condition of things prevails, are now quite aroused to the

necessity of grappling with the case. An important peripatetic committee of Congress on "Arid Tracts," is now at work, and the skill of the cleverest engineers is called upon to devise the best methods for bringing these into cultivation. It is evident that the one thing that has to be done is to make the most of the existing supplies of water, to store these in suitable reservoirs, and bring the water in pipes to the districts where it is needed. To do this effectually will tax the wits of the very best engineers. Some valleys seem to set every possible contrivance at defiance; but the engineering skill and courage that have led the railway over the Rocky Mountains by Sheppard's Pass to a height of 10,000 feet, and in so many other places have overcome obstacles that seemed wholly insurmountable, may in due time find channels for water even over the most formidable obstacles. Nothing can be conceived more fitted to increase the prosperity of Southern California than that its valleys should become "well watered everywhere." The whole country would rapidly fill up with millions of settlers, and an immense bound would be taken toward a state of things which it is by no means Utopian to dream of—when the West shall outstrip the East, and the shores of the Pacific shall show a population equal to that along the Atlantic, in numbers, in intelligence, in enterprise, and in worth.

Besides the elements of prosperity that have now been referred to, there are other resources in Southern California that have as yet hardly begun to be touched. Gold is found in this part of the State, although not in such quantities as in Northern California; it has been found more recently in that part of the Mexican peninsula which lies near San Diego. Iron and coal are known to exist in certain localities.

Springs of oil are found abuundantly near Santa Paula, and in other places, and it is known that there also are supplies of natural gas. If the coal and iron prove good, an immense impulse will be given to local manufactures. Hitherto Southern California has hardly begun to have manufactures of its own. Nearly all its household furnishings, for example, have been imported from the East, causing an efflux of money which has not become embarrassing only because so much Eastern money has been brought in by invalids, or has been invested by capitalists. Even for lumber, Southern California must look beyond itself. The time has come when her sagacious men must grapple with the question of establishing local manufactures. The export of wool amounts to nearly two million pounds in the year, and yet there are no woollen factories. Immense quantities of fruit have to be thrown away that might be utilised if there were but enough of canning establishments. The shipping is already considerable, and it is rapidly increasing. The two chief ports, San Diego and San Pedro, have a constantly growing business; it has increased even in the last two years, which have commonly been reckoned dull. Of the importance of San Diego we have a proof in the fact that it is contemplated to change the port for the Japan P. and O. steamers from San Francisco to San Diego.

Though the progress of the State has been slower during the past two years than immediately before, there still is progress, and that in

many directions. Everywhere more land has been brought into cultivation, more fruit trees and other trees have been planted, houses built or improved, churches and schools erected, roads constructed, streets "graded." Every inhabitant of five or six years' standing has some remarkable tale of progress to unfold within his time. Some of the smaller towns have had wonderful prosperity. Pasadena, a beautiful country town, to a large extent of villas, has a population of some 12,000, the great Raymond Hotel alone having accommodation for 500, and its streets and ornamental avenues are of great extent and beauty. Pasadena has no saloons or liquor shops. Ontario, a town begun by the enterprise of two Canadian brothers, has an avenue of ten miles, lined with four rows of ornamental trees, forming a carriage-drive on one side and a tramcar track on the other, not to be surpassed. Watering-places like Santa Monica and Long Beach owe their prosperity to the beauty of the beach. At the latter place there are eight miles of beach, extending without interruption from one river to another, delightfully smooth and firm, a very admirable and favourite carriage drive. The bathing is good of a kind, but owing to the constant though not heavy surf on the Pacific coast, few bathers do more than paddle about the edge, bold swimming being hardly known.

It would be unfair to compare new sea-side places like these with those of an older country. Their one attraction is the beach. Of excursions to places of interest in the neighbourhood there can be none, because no such places exist. Even when, in a country drive, one lights on a fine avenue of trees, one has not the same satisfaction as in England, but is forced to think how beautiful it *might* be if something were only done to trim it and the road beside it, and make them tidy. And as to country roads, in summer they are simply awful. Fine dust usually lies on them to a depth of many inches, making driving unpleasant and walking impossible. As some one remarked, "You don't need to wait till you bury a man before you see the gathering of 'dust to dust;' the process is only too familiar every day of summer." While there are instances of wealthy men doing something to improve roads and form pleasant drives, there are too many cases of neglect. We had the pleasure of being invited to two old mansion-houses on the large Mexican ranches near one of the seaside resorts, but absolutely nothing had been done to make them interesting. The only possible antiquities in such a country are these old places of the Mexican proprietors, with their quaint houses, thick adobé walls, gardens with covered archways, and fruit trees of the choicest kinds. It is with something more than sorrow one sees such places going to wreck because of the expense of keeping them up. One often sees how little rich Americans in new States are able to enjoy their wealth, how little they can add to the amenities of life, or to the honour and dignity of the position which their wealth enables them to hold.

We have said that it is within the last twenty years that Southern California has come into the actual possession of the American people. Residents of not more than fifteen years tell us that within their easy recollection, Los Angeles, the capital, was a small Mexican town, rude and paltry in appearance; its one-storied adobé houses varied in but a

single instance or two by a two-storied brick erection; the streets, if they could be called streets, covered deep with mud in winter, and dust in summer; unlit, unsewered, unprovided with any appliances of city civilisation. Worse than that, it was disorderly and disagreeable; and, as Sunday was the great day for rowdyism and riot, it was no uncommon thing for an American if he should be seen on the streets to be surrounded by a troop of Mexicans threatening to shoot him if he did not take them into a saloon and treat them.

In 1880, the population of Los Angeles was but 11,000; it is now variously estimated at from 50,000 to 85,000 inhabitants. It occupies a beautiful situation, and was called by the Mission Fathers, La Ciudad de la Reina de los Angeles, The City of the Queen of the Angels, shortened into Los Angeles, "the angels." It is now a very handsome city, laid out like most American towns, well paved, well watered, abounding in fine "blocks" and public buildings; its suburbs studded with elegant villas, all built of timber, but for that reason more easily susceptible of those light and varied forms which show so well amid groves of cypress and banana and palm. Nearly every conspicuous citizen has a block called after his name, a kind of measure to his fellow-citizens alike of his wealth and his enterprise. If one were to specify any of the outer features of Los Angeles that are peculiarly striking, mention must be made of its lighting and of its system of cable-car lines. Its public electric lights blazing on lofty poles not only afford a splendid illumination of the city, but are conspicuous far and wide, surpassing the stars in apparent brilliancy even at a distance of seven or eight miles. The cost of lighting the city is about $32,400 a year. Its cable-car lines would be a prodigy if we were not accustomed in many of the large cities of America to see cars rushing along with no apparent motive power. In Los Angeles they are the more remarkable that it is a city of steep hills, but no hill-side presents the slightest difficulty to the cable car, and no corner is too abrupt for it to whirl round. In the course of the present year (1889), a Chicago Company is said to have spent $160,000 a mile on a circuit of 12 miles, or $1,920,000 in all,—a tolerably satisfactory proof of the confidence felt in the growing prosperity of the city.

Los Angeles has experienced sundry vicissitudes of fortune during the brief era of its modern history. About a dozen years ago, there occurred one of those "booms" with which the newer settlements of America are familiar, outside capitalists as well as its own citizens having "rushed up" prices till it could no longer bear the strain. The principal bank in the place failed; values fell to zero, and rich mines being discovered at the time in the neighbouring state of Arizona, it seemed as if Los Angeles was doomed. But ere long it recovered from its depression, confidence in the future both of the city and the neighbourhood revived, and two years ago (in 1887) there occurred another and a much more remarkable boom, which extended over the whole extent of Southern California. Everywhere the price of land made an enormous leap. The particular mania of the hour seemed to be for "town lots." If the faintest probability appeared that a piece of land anywhere would become the site of a town, the value of the land doubled or trebled in a trice.

Syndicates or companies would purchase a tract, and then fall on all the devices of American ingenuity to "boom" it. The order of things with which we are familiar in old countries would be precisely reversed. In our case we wait till population has gathered, till houses have been built, till the wants of a public community have been developed; we then make roads, rear hotels, open "stores," and provide water on a sufficient scale. But an American Company would purchase a tract in the wilderness, no doubt in an attractive situation; they would build a large hotel, construct a steam or street car line, open a store, "grade" streets, and "pipe" water; lay out the land in town lots, advertise it as the choicest spot in creation, and urge the world to "hurry up" and take possession. When the right spot and the right time have been hit upon, the process has often been highly successful. When a miscalculation has been made, especially as to time, the scheme either falls to pieces, or has to wait for the next boom. It is very strange, as you ride through some piece of wilderness, to observe conspicuous placards on poles informing you that this is Washington Avenue and that is Walnut Street, while these other marks denote First Street, Second Street, Third Street, and so on almost *ad infinitum*. Yet this is the American mode of progress, and if the process be at times overstretched, there can be no doubt that on the whole it has given a remarkable stimulus to enterprise, and quickened energies that would otherwise have lagged.

Southern California is at present in the lull that has followed the boom of two years ago. People tell you now that it was a kind of madness that seized on the community, giving rise to arrant gambling. Many a man with cash enough to pay for one lot, or perhaps two, would purchase a dozen in different places, reckoning that as the price had to be paid in instalments, he would be able to dispose of some of them, and with the proceeds pay his instalments for the rest as they became due. When the boom "burst," as the expression is, and the lots became unsaleable, he could not pay further instalments, and thereby he lost all that he had paid. The "lots" returned to their former proprietors *plus* the first instalment, which in all likelihood was due by him for some similar purchase which he too in the end had to relinquish. But though many have suffered in this way, and though at present there is neither selling nor buying of land, nominal prices have not gone back much from the boom scale. Bargains in land are not to be got, although it may occasionally happen that the acres of some unfortunate man on the edge of bankruptcy must be disposed of at a loss, in order to prevent a still greater catastrophe.

It is somewhat strange, although quite natural, that perhaps not more than one grown man or woman in a hundred is a native of Southern California. Such natives are the children of early settlers who got possession of Mexican ranches, and submitted to the loneliness and the privations of early settlers, in faith that the land would grow in value, and that the country would one day fill up. By far the greater part of the inhabitants are comparatively recent arrivals from the older States, who have been attracted to the place by those features on which we have here dwelt. Out of 29,984 votes in the city and the county of

Los Angeles, it has been ascertained that only 2560 have been born in any part of the State of California, while no fewer than 3228 are natives of New York, 2765 of Ohio, 1877 of Illinois, 1837 of Pennsylvania, 1416 of Indiana, 1015 of Missouri, and smaller numbers of other States. Of foreigners there are 5699, of whom 1552 are Germans, 325 French, 147 Italians, 120 Swedes, and so forth. Of Mexicans there are but 268. The possessions of Queen Victoria furnish a considerable contingent: England 707, Scotland 173, Ireland 967, Wales 50, Isle of Man 6, Isle of Guernsey 1, Canada 501, Nova Scotia 100, New Brunswick 42, Newfoundland 3, Prince Edward Island 22, Jamaica 4, West Indies 7, East Indies 2, "Great Britain" 3—in all, 2588. It is evident that some time must elapse before a community of such miscellaneous origin can be fused into one, and act in concert. This remark applies even more to the country districts than to the capital. But it is not less plain that this great variety of race, or at least of species, may have a very favourable influence in the end of the day on the community. The variety of temperament, of talent, of gift thus brought together must result according to the rules of nature in something good. Already no litle progress has been made in leavening this new community with the spirit of the older civilisation. If the whole State of California had an unfortunate start, in view of the higher and more moral forces that influence the welfare of countries, much has taken place to modify and counteract this disadvantage; and among the remarks that one constantly hears respecting Southern California, none is more common than that there has been a vast improvement on what used to be. There is still an element of rowdyism and lawlessness; but it is confined to that section of the community that frequent saloons, the prize-ring, and the dens of sensual sin. It is not a whit more, if it be not less, than in many of the new Western States. Excited by a drunken quarrel, a man will sometimes shoot down another; ruffians will get into a house and tear the earrings from a lady's ears; a jealous lover will send a bullet through his rival; even an excited woman will shoot a man whom she believes to have been tampering with her little daughter. But are these much more than a set-off to the doings of Jack the Ripper? Certain it is that they have very little appreciable influence on the tranquillity of the community. In country districts, we have been struck to observe the absolute safety of property that could easily be stolen. We have resided in houses where it was hardly thought necessary to lock the front door or fasten the bed-room windows. We have been with a family that have locked up their house (with only a Chubb-like key) for two or three days, left the live stock to be attended to by a neighbour, and returned in peace without missing a spoon from the house, or a chicken from the poultry yard. Of the people in the country who own small holdings, a very large proportion are industrious, sober, church-going families. We cannot but remark that if Southern California inherits from the past a somewhat unsteady element, it has received an immense reinforcement, during the last ten years, of the best elements of American and British life.

In this new contingent lies the hope of the country for the future. To

them we owe the goodly supply of churches and chapels, of Sunday schools and religious societies that are busily at work all over the country. Perhaps to them, in a large degree, we owe the admirable provision for common schools, and such efforts as have been made for a higher education. For both in the quality of its school buildings and in the encouragement given to its teachers, California occupies quite an exceptional position. But much remains yet to be done. The marriage law is lax, as it is too generally in the United States. California has no Sabbath laws, and there is no obstacle in the way of any man doing on that day that which is right in his own eyes. There is nothing to restrain the thousands of heathen Chinese in the State from toiling in the fields on the Sunday, and presenting a very jarring sight to Christian people as they wend their way to church. There is nothing to prevent some daring aëronaut from advertising an ascent on Sunday, probably from some seaside resort, and attracting a multitude of excursionists to the place. It grates sadly on one's feelings to see staring placards on the streets of Los Angeles intimating that the People's Theatre will have a blazing opening on Sunday. Sunday is the great day for excursion trains, and notwithstanding that in the East a resolute effort is being made to diminish Sunday labour on railways, extra trains are run in California on that day, and every inducement given to the multitude to take advantage of them. Of four daily newspapers in Los Angeles, three have Sunday issues, and if a subscriber should decline to take the Sunday paper he is sure to lose the thread of events. The saloons open on Sunday, not only in the city, but wherever in the country there is a chance of catching customers. That tent in Central Avenue, close to the terminus of a car line, four or five miles out of town, is a saloon. The proprietor seems to have had only to rent "a lot," set up his tent, stow away his barrels, and go to work with his business. Any plea of necessity for a saloon in such a situation would be simply ridiculous. Some worthy men tried to buy him out, but his terms and theirs were far asunder. Such places are at best sources of demoralisation and excitement to lawlessness, and it is very hard for the quiet settlers in the neighbourhood to have one planted in their midst against their strong wishes, with all its possibilities of mischief.

There remains a question that must have our attention in closing. Who ought to emigrate to Southern California? The answer is two-fold, according as the more immediate object is to recover health or to make a livelihood. As we have said, it is ailments of the throat and the lungs for which the climate is most directly adapted, and if the case be taken in time and certain precautions used, there is little cause to doubt that health will be regained. The precautions are, that the patient be provided with sufficient means to enable him to dispense with hard work for a time, and to enjoy the open air, and that he be protected from the night air, especially in winter. For at that season the variation of temperature is considerable—twice in twenty-four hours—giving rise to a proverbial *mot* that "one takes cold twice a day in Los Angeles." A little care at first will prevent this, and by and by the constitution becomes acclimatised.

It is not so simple a matter to deal with the question, Who ought to emigrate for the sake of a livelihood? What the country presents to an emigrant possessed of a little capital is a choice between the life of a farmer and that of a gardener. If his object is to rear stock he will have to purchase a ranch of from one hundred to some thousands of acres in extent, and this can only be had at a reasonable figure in the more remote parts of the country, and where little or nothing has as yet been done for the land. The land may be got there for little, but the outlay in stock and buildings must be considerable. The gardener must look for land nearer a town. In the neighbourhood of Los Angeles it sells very high, say from 400 to 4000 dollars an acre; but this last is far above the agricultural value, and is never obtained except when there is some prospect of its being ere long turned into "town lots." In the neighbourhood of the smaller towns land is much cheaper. But even there an emigrant who is to live on the produce of his land must carry with him a few hundred pounds of capital, because, besides his outlay for land, he must bear the cost of house and farm buildings, the inevitable horse and buggy, or wagon, and such other live-stock as he may require. A farm of ten acres may consist one-half of orchard and one-half of farm land. The land would produce sufficient for two cows and a horse, and from the dairy and poultry yard there should come enough to defray the cost of butcher-meat, bread, groceries, and whatever else in the shape of food the settler must get from the stores. By good management the produce of the orchard would be available for other purposes. The style of living must be plain, but it does not need to be rough. The profits of ten acres afford no means for keeping servants, either in the house or in the field. Service is by far the most costly article in Southern California. Much of it is done by Chinese, and their usual remuneration is from twenty to thirty dollars a month, with board, a good cook rising perhaps to forty. The ordinary pay of a farm labourer is a dollar a day and his board. People in middle life settling without a fortune in the country must lay their account with being their own servants. And the prospect for the future in this respect is not bright. A law has recently been passed preventing the Chinese from coming to settle in California. If that law stand, the present supply must gradually melt away, and no new supply can be looked for. How the place of Chinese is to be filled up is a question which can only be guessed at. If young women would accept of situations, they would easily obtain £50 a year with board.

It is a feasible thing for working men without capital to go to Southern California, and endeavour, by saving their days' wages, to accumulate what will be sufficient to set them up in a small ranch. In good times a skilled tradesman may reckon on four dollars a day. But in a new country which is governed to a large extent by booms, making the price of labour a ransom at one time, while there is no demand for labour at another, high wages cannot be reckoned on as a permanent thing. And skilled workmen are so determined now not to accept of low wages, and not to work at anything except their own trade, that in a condition of collapse their situation may become very trying. The tendency of things is naturally towards a more settled condition, more

steady work and more regular wages, and it is not likely that in the future there will be so much of inequality as in the past.

With regard to other branches of industry—mines, manufactures, and the like—but little has been done in the southern part of the State. If coal and iron should be obtained in sufficient quantity and quality, that would give a great impulse to many branches of industry at present unknown. And it is hardly possible that the establishment of local manufactures can be delayed much longer. The population is becoming such as to make it unreasonable that for so many of the necessaries of life the State should be entirely dependent on distant establishments. If such industries were established there would be scope for a much larger supply of working men. But this must be left to the natural course of things. It would not do to apply the spur to a community which has shown a much greater tendency to go too fast than too slow.

The case of Southern California, so favoured by nature, and so open to new settlers, has hardly a parallel even in colonial history. In not a few respects the western portion of British Columbia resembles it, but it cannot produce such fruits. Access to the Pacific Coast is now comparatively easy. In the United States four lines of railway unite the Atlantic and the Pacific Oceans, the Northern Pacific, the Union Pacific, the Santa Fé, and the New Orleans and Southern Pacific, while the Canadian Pacific makes the same junction for Canada. Even for ordinary travellers the rates are comparatively low, and for emigrants and excursionists they are made still lower. There can be no doubt that in the generations to come the shores of the Pacific will be eminently attractive, and that the stream of emigration will flow plentifully to them. And so far as outward conditions go—we grant they are but secondary—there are few parts of the world that give better promise of a serene and happy life.

## GEOGRAPHICAL NOTES.

### ASIA.

**A Jungle Race.**—Mr. George Cadell, late of H.M. Indian Forest Department, has communicated to us the following particulars concerning the Kanikaras and the country they inhabit. "Travancore," he says, "is one of the smallest of those states which remain under native rule. Its area is 6730 square miles, and its population 2,311,279, insignificant figures beside those of the area and population of the whole empire of India—1,378,044 square miles, and 254,000,000 inhabitants. There is a British resident at Trivandrum, the capital, and the native contingent is under the direction of British officers. But Travancore has always been loyal to the British Government, and she has enjoyed a succession of enlightened rulers who have proved themselves ready to adopt a far-seeing policy in matters of internal administration." After paying a high tribute of praise to the present Maharajah, His Highness Ráma Varmá, and to his Prime Minister, Sir T. Madava Row, K.C.S.I., Mr. Cadell continues: "The special goal to which the object of this paper is directed is the jungles of Southern Travancore, with the little-known races who are the particular dwellers therein. But it is only courteous for us in passing to refer to the inhabitants of the low country, which we shall have first to traverse. And I think that they merit more than the passing glance which is all that we shall now be able to bestow upon them. More

than half the population are Hindus, and so widely are these represented that, of the 420 castes into which they are divided throughout India, no less than forty-nine are found in this country, whose number in each case exceeds 1000. More than one-fifth of the entire community are Christians, some attracted no doubt by a desire to obtain 'master's favour,' but others from a sincere conviction of and belief in, the truths of the Christian religion. Besides the converts of the London Missionary and Church Missionary Societies, the Roman Catholic and Syrian Churches are strongly represented. The Mohammedans are to the Hindus as one to ten, or somewhat less, which is very much under the average ratio, there being in India about 188,000,000 Hindus, and about 50,000,000 Mohammedans (1881). The dominant castes are of course the Brahminical, of which there are five, or, according to some native authorities, eight. Numerically they are unimportant, but their power over the sovereign is enormous, and they have large stores of accumulated wealth. To say nothing of the annual revenues and regular allowances of the Brahmins, burdens which weigh heavily on the resources of the State, some of the ceremonies performed by the Maharajah, while they no doubt increase his own sanctity, yield something more tangible to his religious advisers. I shall mention only two of them here : the scale-weighing, when the Rajah's weight is balanced by a number of gold coins placed in the opposite scale, and the second birth of the Rajah in the Golden Womb, a vessel intended to represent the womb of a cow, and which should not be of less weight than the Maharajah. If His Royal Highness be judiciously trained, each of these ceremonies may result in a good £12,000 to the attendant Brahmins, who receive the coins and vessel. There is plenty to say, did space permit, of the other castes to which I have alluded. The temptation is great also to enter into a consideration of the Royal Family and the curious laws of succession to the throne. In Travancore a man's nearest heirs are his sister's children, not his own, and the sons of the Rajah may indeed succeed to his personal property, but they have no claim whatsoever to the throne, and their descendants are soon absorbed among the people. But I must pass on to the hill fastnesses of the Kanikaras, or Jungle Kings (the literal meaning of the word is 'landed proprietor,' or 'lord'). Kings of the Jungle indeed they are, with none but elephants to dispute their sway ; but, so far as the castes of Travancore are concerned, they are the lowest of the low. They may not approach any of the shopkeeper or trading classes within twenty paces, so, when they wish to make any purchase, they deposit their money on the stump of a tree or on a stone, and retire until it is replaced by the commodity for which they are bargaining. It was within the domain of this people, whose hereditary rights are as yet for the most part unchallenged, that I lived *sub Jove* on a rock, or under the meagre cover of a grass roof over a platform built in the fork of a tree—in any case out of the reach of the elephants, which, though not wantonly hostile, are sometimes inconveniently inquisitive. The spotted deer and the sámbhar appear to be more palatable to the hill tigers than either the white or black jungle man, for, although traces of them were numerous, and the black-haired monkeys hooted out their dissatisfaction at the intrusion of their striped enemy, I had no experience, on this occasion at at least, of attacks from these animals. Bison were plentiful but not aggressive, unless a solitary bull were met with. Rufous-coloured wild dogs in regular packs pursued their systematic chase of the chitál, quite unconcerned at the presence of their white visitor. Snakes also were to be found, especially the hill cobra (*Ophiophagus elaps*), a much larger and more prettily marked fellow than his lowland cousin. Although this is one of the most aggressive of all the Indian thanatophidia, like all other snakes as far as my experience goes, it never commences an attack unless in danger of being trodden on. By far the most vicious and pertinaceous

of the jungle pests are the leeches. Gaiters are to some extent a protection for the lower limbs, but the upper part of the body is accessible to these creatures from the leaves of trees, etc. The coolies used to rub their legs with limejuice to keep them off—I believe effectually."

"At first the Kanikaras were as invisible as the tigers, leaving their huts *en masse* at my approach, although I affected no Brahminical sanctity. But if their friendship be desired, a small tin of English gunpowder suspended at the door-post of the most conspicuous of their dwellings will go far to attain that object. Nor will this friendship be altogether one-sided, for many a successful hunt will be secured and many a wounded animal will be recovered by the help of these dwellers in the woods. Their weapons are usually bows and arrows, and their quarry the black-coated monkey or the pea-fowl, but some of them have obtained matchlocks, constructed on anything but the most approved principles, which they load with an indefinite quantity of coarse powder and a hammered iron bullet, or perhaps two. The windage is considerable, and the course of the projectile erratic, but still these fire-arms have caused the death of many an elephant and bison bull. Hence the attractive power of English powder, the finer particles of which, adhering more closely to the pan of the matchlock, are less easily shaken out and are more susceptible to the touch of the match. In return the natives will build for the traveller a good bungalow, with an inner roof of leaves of the *irál*, an elephant reed, and an outer one of lemon grass; will entertain him with impromptu shooting matches in which a bottle serves as a mark, and the prize is a sheep; initiate him into jungle ways, and introduce him to the jungle fauna. The Kanikaras obtain fire by the revolution of a stick of hard wood in the hollow of a dry bamboo. They kill animals by traps of massive timber, containing a bleating goat in an inner chamber, to which access can only be obtained under a heavy beam, so balanced as to fall on the slightest touch. Even the sagacious elephant used to fall a victim to the bamboo-covered pit-falls of the wily hunters, but now other methods of capture less barbarous and more profitable have been adopted. In Travancore elephants are the property of the *Sirkar* or government, which maintains an elephant-catching establishment. The Kanikaras are required to assist in securing these animals, and beyond this and other quasi-feudal services, such as supplying wax and firewood to certain temples, are entirely free from taxation."

Mr. Cadell then describes the capture of an elephant, a scene familiar to readers of narratives of sport. Returning to the Kanikaras, he says:—"Compared with other savage races I must confess that the Kanikaras occupy a very low place in the scale of humanity. Darwin, I think, places on the lowest rung of the ladder those savages who cannot count beyond four. The Kanikaras cannot count beyond ten. One hundred is represented by ten stones, each assumed to consist of ten units, and so on with other numbers. (A decimal method of notation: Mr. Cadell no doubt means that they have no numerals to denote higher numbers than ten.) But, though their mental acquirements are in certain directions imperfect, in their proper domain, the virgin forests, where they have no rivals and none but Nature's books, these men do in some sort at least merit the name of Jungle Lords. In stature they are short, and their clothing is but scanty. Perhaps the most conspicuous articles of dress are the bead necklaces and leaden ear ornaments worn by the women. Narrow loin-clothes complete the toilet. The Kanikaras practise agriculture on a primitive system, cutting down or clearing by fire as much of the forest as will suffice to produce their crops of arrowroot and sweet potatoes, and migrating to other parts of the jungle when these clearings are impoverished or exhausted, say in two or three years' time. In this way they destroy large tracts of virgin forest, which, when abandoned, are soon overgrown

with underwood, and form impenetrable scrub. Some of the smaller tribes—for here, too, is to be found clanship on a miniature scale—despise all attempts at agriculture, and live on such roots as they can obtain by digging, and on the spoils of their bows and arrows, in the use of which they are expert. The marriage ceremonies of the Kanikaras are of the simplest kind. The bride is bought from her uncle, is often harshly treated, and may be dismissed at will. The gods of this people, or rather demons, to judge from their names and characters, are numerous, and exact a heavy tax of oblations. They object to the education and advancement of their worshippers, and send elephants and other wild animals to destroy the crops of the disobedient. Their ranks are recruited from the spirits of deceased Kanikaras, those being specially selected who have not shown themselves very gentle in this life. This jungle race is for the most part congregated within a limited area, the Travancore side of the Southern Ghats, a country which, though it lies only some 20 miles distant from Cape Comorin, is still practically unexplored. The watershed here forms the boundary between the Travancore and British territories, and it runs across a grassy plateau above the range of jungle fever. Muttu Kúlú, or the Hill of Pearls, was formerly chosen by the Maharajah of Travancore for a sanitarium, but the mists which accompany the cool air of these heights damped the ardour even of such a warm admirer of English tastes as His Highness, and no practical results followed."

"The lower heights have to some extent been occupied by English planters for the cultivation of tea and coffee, and the Kanikaras proved efficient guides in the early explorations. As regards the latter article, the enterprise was at first very promising, the coffee grown being of excellent quality, but it failed on the advent of the *Hemeleia vastatrix*, that dreaded and unconquered fungus which ruined the coffee-planters of Ceylon. It is more familiarly known as Leaf Disease, the leaves of the tree being attacked at the time they are least able to sustain such injury, the result being that berries and leaves drop off together. No remedy has yet been discovered, though large sums have been spent on experiments. The destruction of large areas of forest may have had some share in producing this disease, by diminishing the leaf supply, and hence allowing the air to become polluted by deleterious gases, which will be absorbed when the trees grow up again. Meanwhile the coffee plantations have been replaced by tea gardens, while a more sparing use is made of the axe; and these hills, being exposed a little to both monsoons, are well suited for the cultivation of this plant, which requires frequent rain for the periodical *flushes* of tea-producing leaves. Cardamoms grow wild on the hills, and, being a monopoly, are collected by state officials assisted by the Kanikaras. The bamboo, besides its economical uses, serves to indicate the age of a Kanikara. The man who has seen it blossom thrice is a sage among his fellows. Lastly, the timber trees deserve mention, for I doubt if any other forests in the world can show such a variety as those of Travancore. Here is the giant teak, the oily wood of which resists dry rot and even the attacks of the destructive white ant. Here grows the so-called blackwood (*Dalbergia latifolia*), which yields the rosewood of commerce in planks often 4 feet broad. The ebony also (*Diospyros*), with its spongy sap-wood and jet black core is found here, and higher up on the tableland the fragrant sandalwood, from the drops of which a most valuable oil is distilled. And there are many trees of such density that when transported by water they have to be buoyed up by bamboos."

## AFRICA.

**Kong: Captain Binger's Expedition.**—France has now connected her possessions in Senegambia with her settlements on the Guinea Coast by adding the States of

Tiéba, Kong, Bonduku, and other smaller territories to the list of her dependencies. Capt. Binger gives a full account of his journey from Bammako to Kong and Mosi in the *Bulletin de la Société de Géographie*, 3me. Trim. 1889. He set out from Bammako, on the Niger, in the spring of 1887, with a well-equipped expedition, having chosen a route through the States of Samory, partly because it would take him most directly to Kong, the principle goal of his journey, and partly because he expected to meet with no difficulties as long as he was in the territories of that prince. But only some fifty miles from Bammako Capt. Binger was stopped by Samory's officials, and forced to wait until the permission of the chief for him to proceed had been obtained. Samory was at that time at war with Tiéba, and was besieging his capital, Sikaso, with little success. With the aim of patching up a treaty between the two potentates, Capt. Binger left his followers on the banks of the Bagoé, and hastened to the camp of Samory. The whole country had been converted into a vast charnel-house by war and famine. Sikaso is a town containing 4000 to 5000 inhabitants, fortified by an immense rampart of earth. All Samory's efforts had been baffled by the vigilance and activity of Tiéba, and communication with the surrounding country was still open. Though, however, Samory had lost a large number of men, and had to draw his supplies from considerable distances, Capt. Binger could not persuade him to come to terms with Tiéba. But he fell into a difficulty himself, for Samory spread about a report that he was the forerunner of an army of white men sent to his assistance, and wished to keep him there to give colour to the report. At last Capt. Binger, by speaking decidedly and authoritatively, escaped from his semi-captivity, leaving Samory to continue the siege for twelve months longer, when he was obliged to retire ignominiously. Returning to his men at Benokhobugu, he marched towards Tangréra, with the intention of passing out of Samory's territory as soon as possible, but at a village only two and a half miles from the town his guides deserted him, and the headman ordered him to retrace his steps immediately. Accordingly, at eight o'clock in the evening he was obliged to re-commence his march in a deluge of rain. It was this event which gave rise to a report of his death. He returned to Tiong-i, on the Bagoë River, where he stayed a fortnight, when, having gained the goodwill of the neighbouring peoples, he passed on to Furu, and encamped among the Sénefu. These people, who dwell in the States of Tiéba, in Fuluna, and in Tangréra, have a language of their own, which is almost entirely monosyllabic. They are good agriculturists and cattle-breeders, and are singularly skilful in metal-work and pottery. Their amusements, religious customs, and funeral ceremonies are of a very original character. Capt. Binger was obliged to remain a month in Furu, while he prepared the tribes in advance for his coming, and negotiated with Pégué, the chief of Fuluna, for permission to pass through his dominions. He made the journey to Niéle, the capital, in six days, traversing during the last three days a rich region, formerly covered with villages, but now abandoned to wild animals, which are very numerous, especially elephants. Pégué caused him to be conducted to Kannièra, the residence of Yamory-Uattara, one of the chiefs of the Kong country. Between Fuluna and the Kong States Capt. Binger met with the first stream running south, which he subsequently discovered to be the western branch of the Comoë, which enters the Gulf of Guinea at Grand Bassam. Its source lies 300 miles to the east of Bammako, and almost on the same parallel. Where Capt. Binger crossed it, its bed was 130 feet broad, and at that time, 1st February, contained about three feet of water. This river separates the country of the Senefu from a collection of tribes belonging to eight different races, more or less clothed, and speaking distinct languages. The most curious are the Mboin, who wear nothing but hats. At two hours' journey from

Kong the traveller perceives that he is approaching a large city; the woods are cut down and the ground is untilled, for it is exhausted. Not the smallest elevation could be seen: the mountains of Kong were not visible. On 20th February 1888, one year to the very day after leaving Bordeaux, Capt. Binger entered Kong, and was received in the market-place by Karamokho-Ulé, the king, and by Jarawary, the governor of the city. Kong, or Pong, is a large unfortified town, containing 12,000 to 15,000 inhabitants, all Mussulmans. The houses are of adobé, with flat roofs: the narrow, winding lanes converge to the market-place, a square 220 yards across. Each of the seven quarters of the town is under a sort of mayor. Besides the king there is an *imaum*, who has the public education under his charge, as well as ecclesiastical matters. Few men at Kong are illiterate, and they are by no means so fanatical as the Peuls or the Arabs. The trade of Kong is in a very flourishing state, and, besides the necessaries of life, European articles brought from the coast—woven goods, arms, ammunition, hardware—may be procured in the market. The native products are kola nuts, allspice, etc. Cowries and gold dust, brought from Lubi, Bonduku, Niénégué, and Gurunsi, are the mediums of exchange. The cotton cloth of Kong finds a market over all the country within the bend of the Niger, and as far as Ashanti and the Gold Coast; 150 pits for dyeing with indigo are in constant activity. A few horses are reared. Capt. Binger procured a very fair animal in exchange for a collection of heterogeneous articles worth about £32. On 12th March Capt. Binger set out from Kong with a train of seven men and ten asses, and preceded by two Mussulmans to prepare the people for his coming. The inhabitants are extremely superstitious, and the novel appearance of Capt. Binger and his strange equipment rendered him liable to be taken for a sorcerer. Twenty days' journey to the north of Kong lies Sia, or Bobo-Diulasu, a town of 3000 to 4000 inhabitants. Being situated at equal distances from Kong and Jenné, it is of great importance as a trade-centre. It always contains more than a thousand persons who have brought salt to exchange for kola nuts, woven materials, and gold. Captain Binger then proceeded through Niénégué and the countries of the Bobo-Diula and the Sommo to Uahabu, the residence of the most influential chief in Dafina. In this region rises the most important branch of the Volta. It is formed by two streams, each some 20 yards broad, and makes a curve to the north before passing southwards through the auriferous districts of Niénégué and Gurunsi. The chief of Uahabu recommended Captain Binger to a colony of Mosi, dwelling on the banks of the Volta, who conducted him across the Gurunsi to the nearest villages of their people. The Gurunsi is a country with exuberant vegetation, and is perpetually overrun by bands of robbers from Zaberma and Songhay on the left bank of the Niger, north of Haussa; and here Captain Binger had two asses stolen in the night. He was very cordially received by Boukary-Naba, at Banéma, and by his brother Naba-Sanom, king of the Mosi, at Wogodogo; but the news of the advance of a German expedition from Togo along the Volta alarmed the people, the negotiations which had been commenced with a view to establishing a treaty were broken off, and Captain Binger was invited to return by the way he came. This was a great disappointment, for he had intended to push on to Libtako, in order to connect his explorations with those of Barth, and then descend by Gurma and Bussang to Salga. The Mosi inhabit a fine plain country admirably adapted for tillage and cattle. The density of the population is 40 to 50 per square mile. The horses are excellent, but come chiefly from Yatenga, a district lying between the Mosi country and Masina. Bukary-Naba gave Captain Binger two very fine ones, a chestnut and a roan. From Banéma the journey to Wola-wola, a Mussulman town on the eastern branch of the Volta, occupied eighteen days. The people on

the route are heathens, and were very unfriendly: their villages consist partly of subterranean dens. After staying at Wola-wola forty-five days to recruit, Captain Binger proceeded to Salga, a town of 6000 inhabitants, and the dirtiest he had ever visited. Water has to be fetched from a stream 8½ miles distant. Salt and kola nuts are the chief products and articles of export. Passing through a beautiful country clothed with rich vegetation, Captain Binger came to Kintampo, a town situated in a clearing, and surrounded by splendid bananas and rich fields. Being then obliged to turn northwards, owing to the country on the direct route to Bunduku having recently been devastated by war, he visited a group of mountains about 2200 feet high, which forces the main branch of the Volta to turn eastwards. The rocks, of which the group is composed, are blue-veined granite and grey and black sandstone. At Bunduku Captain Binger stayed a few days to rest and to communicate with M. Treich-Laplène, who had been sent out in search of him, and had passed through Bunduku on his way to Kong. It is an important commercial town dealing in European articles brought from the coast, in kola nuts, salt, and other native products. Cowries are in circulation, but the chief currency is gold-dust. On his way to Kong, a journey of nineteen days, Captain Binger turned aside to visit the auriferous grounds of Samata. He was unable to see the process of washing the gold, for it can be carried on in winter only, no water being obtainable at other seasons. He re-entered Kong on January 6th, 1888, after an absence of eleven months, and there signed a treaty with Karamokho-Ulé, which placed the States of Kong under French protection. M. Treich-Laplène had already concluded one with Bunduku. The Kong country is very large, extending over nearly three degrees of longitude from 8° 30′ to 12° N. lat., and contains a large number of small districts besides the territory of Kong proper. Captain Binger wished to open out a direct route from Kong to Grand Bassam, and therefore followed the right bank of the Comoë through Jimini and Anno, where he made treaties with the chiefs similar to that signed at Kong. The people are peaceful, cultivate cotton and indigo, trade in salt, iron, etc.; weave cotton goods, and manufacture bark cloths, and thread from the fibres of the pine-apple for embroidery. But in Anno the great industry is extraction of gold.

In all this country there are no mountains rising to a height of more than 6000 feet above the sea-level, and those are elevated not more than 3000 feet above the surrounding country. One of the chief groups is the Natinian Sikaso, which divides streams running northwards to the Niger from the two great branches forming the river Comoë. One of its offshoots terminates in the country of the Bobo, and separates the waters of the Comoë from the streams which unite to form the main, or western, arm of the Volta. In Kipirsi elevations with precipitous flanks confine the western arm of the Volta, and disappear in the elevated country of the Mosi. Another group, the Nauri, lies between Banema and Wola-wola: its principal peak rises to a height of about 6000 feet, and stands 3500 feet above the surrounding plateau. Across the gorge through which the eastern Volta flows, are the mountains of Gambakha. Farther southwards the land sinks gradually to Salga and to the low-lying plains of the Volta, which in winter are inundated to a distance of some miles from the river. Around Kong no mountains are visible: if the mountains of Kong do exist, they do not approach near the town, which, however, stands on a plateau raised 2300 feet above the sea-level. The Lahu and the Dabu, which enter the lagoon of Grand Bassam, flow from elevated land to the north-west of Kong, and both to the north and south stand a few elevated peaks, among others the Komono, where the Comoë is diverted from its easterly course and turned towards the south. Captain Binger was able to

determine pretty accurately the zones of cultivated plants. Millet and sorghum were not found farther south than 8° N. lat. : yams barely reach the 12th parallel. Between the coast and the 8th parallel no grain is found, the only crops being maize in small quantities, manioc, yams, and bananas, which are here the staff of life. Captain Binger's instruments got out of order after fifteen or eighteen months and therefore his later observations cannot be relied on. He estimates the total length of his wanderings at nearly 2500 miles.

**The French Sudan.**—The *Bulletin de la Société de Géographie*, Paris, No. 1, 1889, contains an article, by Lieutenant-Colonel Gallieni, on the French Sudan. This territory is bounded on the north and north-east by the Senegal and its tributary the Baule, on the south by the sources of the Niger and the frontier of Sierra Leone. The province of Bammako also, which lies to the east of the Baule, is in the possession of the French. A considerable part of this vast area, however, is not yet under French administration : Futa Jallon, for instance, is only a protectorate. But Colonel Gallieni looks forward to a consolidated French territory at no distant date. The acquisition of the Portuguese colonies on the Rio Geba and Rio Grande, by purchase or exchange, would render it still more compact. During the years 1887 and 1888, much was done to establish on a firm footing the authority of the French Government, and to extend its influence among the tribes beyond the limits of its possessions. The states of Samory and Tieba and the kingdom of Segu on the right bank of the Niger, the territory of the Bambaras on the left bank, and the states of Ahmadu north of the Baule, have been placed under French protection. The Moorish nomads, who dwell on the borders of the Sahara, and carry on the caravan trade with the north of Africa, have also given in their adhesion. The old French possessions on the Senegal had an area of 14,674 square miles and a population of 181,600 ; the French Sudan has an area of about 50,800 square miles, and a population, 283,660 ; lastly, the protectorates are supposed to have a population amounting to 2,534,000 in the aggregate. The fact that the distance, as the crow flies, from the centre of Beledugu to Sedhiu on the Casamance is 620 miles, gives some notion of the extent of the French territory.

Ten departments have been formed for administrative purposes. The most eastern of these is that of Bammako, and comprises the country lying in the angle formed by the Baule and the Niger ; it is composed of the three districts Guéméné Diedugu, Beledugu, and the State of Bammako, peopled by Bambaras ; the plain on the left bank of the Niger ; and the State of Kangaba, inhabited by Malinkés. The rivers Fia, flowing into the Niger, and Dela, a tributary of the Baule, which traverse Beledugu, were formerly supposed to unite and form a connection between the Niger and the Senegal, but such is not the case. The country, particularly the southern part, between the Manding Mountains and the Niger is well watered and fertile, and the river abounds in fish. The French commander at Bammako has little authority over the greater part of this district, and on the north the people need protection against the raids of Ahmadu and the Moors. The line of the French posts from Bammako to Bafulabé passes through the least fertile, most unhealthy, and most sparsely peopled country in the French territory. To the south of it, however, lies the rich country of Buré, bounded on the east by the Manding Mountains, the capital of which is Siguiri, on the Niger, 155 miles from Bammako. Gold is at present the sole commercial product of this district, but the soil is well adapted for the cultivation of cereals, particularly rice ; and now that the inhabitants are protected from the devastating troops of Samory, they are beginning to rebuild their villages and cultivate their fields. Besides Sieke in the Manding Mountains, two districts on the right bank of the river—Sendugu,

between the Niger and its tributary the Fié, and Diuma Gagna, between the latter river and the Sankarani, which have placed themselves under the direct rule of the French authorities—form parts of the department of Siguiri. This town is now protected by a fort which Colonel Gallieni erected on a plateau 5900 feet above the river, and is connected with the Senegal by a telegraph. From this point several officers were despatched with small parties to explore the country between the Niger and the Upper Senegal. M. Famin passed through Kita to Bafulabé, and explored the upper course of the Bakhoi. He found the country thinly peopled by Malinkés, but full of game and much frequented by elephant-hunters, who sell the ivory to the traders of Buré. M. Bonaccorsi made first for Balandugu, 55 miles from Siguiri, near the sources of the Bakhoi, and then proceeded by the Bafing to Bafulabé. He found that the Falémé is confined on the east by the mountains of the Bafing, and runs from south-east to north-west. His observations as regards the hydrography of the country are very valuable. M. Vittu de Kerraoul explored the course of the Falémé.

M. Liotard, a naval surgeon, has explored Fuladugu, Niani, Kalondugu, and other countries lying to the south-west of Bakel, which were acquired by the campaign on the Gambia in 1887-1888. Fuladugu or Firdu, which must not be confounded with the district of the same name between the Baulé and the Bakhoi, is traversed by three large rivers, the Gambia, the Casamance, and the Géba. Besides being important commercial highways, these rivers produce a large variety of articles of export, because the nature of the soil is different in each basin. The English factories on the Gambia used formerly to traffic with Futa Jallon through Kantora, but this line of communication has been cut off by frequent wars, and the trade is confined to the produce of Fuladugu—ground-nuts, cattle, hides, wax, mats, and combs. Cattle are especially plentiful, and the exportation of ground-nuts now amounts to three or four thousand tons a year. On the other hand, the basin of the Géba, being well-watered and extremely fertile, abounds in oranges, bananas, coffee, and oleaginous fruits; but caoutchouc is its principal article of export. On the Casamance, though rubber plants are found in this part of Fuladugu also, they are not turned to account, and the products are similar to those of the Gambia basin.

M. Levasseur, lieutenant of marines, crossed the Gambia into Futa Jallon at Kedugu, not far from the mountain group of Tamgué. This group seems to be a part of an elevated region which extends from the mountains of Kong at an angle of about 30° with the magnetic meridian. The force of upheaval has produced its greatest effects in the Tamgué group, where some peaks, as the Lansan, rise to a height of 3600 feet. Farther south the mountains are less elevated, rising only to about 650 feet above the surrounding country. They have, however, an elevation of nearly 3000 feet above the sea, and are the birthplace of the streams which flow north, west, and south-west to the Atlantic. The land is fertile and well cultivated, and the climate salubrious. It produces the cereals found in other parts of the French Sudan—rice in great abundance. Fruits also, as oranges, bananas, lemons, are plentiful; but the principal products are cattle and caoutchouc. The Kankuray or Kakrima, which falls into the sea under the name of the Dubreka, is probably the best channel of communication with the coast. The Comba and the Gambia, or Dimmah, both rise at a few miles' distance from Labé. The former flows in a confined valley, first to the north-east and then to the north-west, until it reaches the latitude of Méké, where it turns westwards, and, having received numerous tributaries, enters the Portuguese possessions, where it is known as the Rio Grande. M. Levasseur regained the right bank of the Gambia by the ford of Marugu, and entered a region of a totally different character. Instead of mountains

he found scarcely perceptible undulations, and no more torrents, but sluggish streams of rain-water. Tall trees and thick brushwood cover this solitude, and the river in particular is difficult of access on account of the dense vegetation on its banks. Its course, as far as the ford of Badi, is very rapid and bestrewn with rocks, which render navigation impossible. At the ford mentioned the Gambia becomes wider and less rapid, and after many detours arrives at the Kolonko Talota, a singular rocky elevation forming a barrier across the stream, which is probably a prolongation of the mountains of the Gabun. The British endeavoured to enlarge the narrow channel by which the waters of the river pass this barrier so as to allow barges to ascend, but the nature of the ground rendered the undertaking too difficult. Below, the river can be navigated by steamboats at all seasons, and it is superior to the Senegal as a commercial highway. Leaving the Tenda, an almost uninhabited plain covered with vegetation and tenanted by wild animals, M. Levasseur crossed the Gambia for the last time, and reached the Casamance at the village of Diannah-Maléry, the farthest point to which trading boats can ascend. It has here a breadth of 650 feet, and a depth of 20 feet. M. Levasseur estimates its course from Yabutagenda to Diannah-Malery at 96 miles, and from the latter place to Sedhiu at 43 miles.

Two officers, M. Plat in 1887 and Colonel Audéoud in 1888, have crossed Futa Jallon to Benty on the coast. M. Plat started from Bafulabé, and, passing through Dinguiray and Timbo, the capital of Futa Jallon, reached Pharmoréa, the highest navigable point on the Mellacorée. The distance is 556 miles. M. Plat discovered the source of the Senegal (called Baléo in Futa Jallon) at about 28 miles from Timbo, in 10° 30′ 53″ N. lat. and 12° 7′ 55″ W. long., at an elevation of 2588 feet. Timbo is marked in the present maps 56 miles to the east of its true position. Col. Audéoud travelled from Siguiri to Benty, a distance of 373 miles. He approached the Niger again at Nora, and thence proceeded to Timbo, and joined Plat not far from Pharmoréa. Colonel Gallieni considers it very important that this route should be opened up, seeing that it would be the most suitable channel for the trade of Futa Jallon, would connect the rivers of the south with the rest of the French Sudan, and afford the most ready access to the Niger.

It is evident, then, that the French have been very active of late in the country between the Senegal and the Niger. They have also sent out explorers beyond these limits ; the gunboats on the Niger have been sent to explore the Mayel Balevel, a tributary of the Niger on the southern side ; and Lieutenant Caron has reached Timbuktu. (*Vide S. G. M.*, vol. iv. 161.) The area of the whole region under either the control or the protection of France, and stretching from the Sahara to the frontiers of Sierra Leone and Liberia, Colonel Gallieni estimates at some 270,000 sq. miles, with a population of some three millions. Yet Colonel Gallieni is not satisfied. He would have his countrymen push down the Niger to Burrum Bussa, where barrier rocks are said to interrupt navigation, and thence establish communications with Sokoto. Should this proposal ever be converted into an accomplished fact, it is hardly necessary to say that the interests of the British establishments on the Niger would be seriously affected. Towards the south Colonel Gallieni wishes a junction to be formed with the French possessions on the Guinea coast. Most of the interior would then be in the hands of the French, who could control the trade, and starve out, if they pleased, the colonies of other European Powers on this coast.

A railway is in course of construction from Kayes, on the Senegal, through Bafulabé to Siguiri ; it is now finished to Bafulabé (80 miles), and has caused a rapid development of the towns on its route. MM. Fortin and Famin are preparing a map of these regions. It will be on the scale of 1 :500,000, and will be

divided into six sheets. Its limits will be the 8th and 18th parallels of north latitude and the meridians of 1° 39′ 51″ and 17° 39′ 51″ of west longitude.

The *Bulletin de la Société de Géographie de Marseille* announces the publication, in the *Journal Officiel*, of a decree by which the Rivières du Sud are formed into a separate administrative district. The duty of the Governor of Senegal towards this district will henceforth be confined to a general supervision of its political affairs. The new Lieutenant-Governor will also have authority over the French possessions on the Gold Coast and the Bight of Benin, which have hitherto been attached sometimes to Senegal and sometimes to the Gabun.

## AUSTRALASIA.

**New Guinea.**—"Further Correspondence respecting New Guinea" (Blue-Book, C, 5883) contains some interesting communications from the late Special Commissioner, Mr. John Douglas, and from Mr. A. Musgrave, Deputy Commissioner, as well as various letters from Sir W. MacGregor, some relating to the arrangements of his administration, and others describing various expeditions, undertaken mostly in pursuit of murderers, and incidentally throwing a good deal of light on the condition of native society and on the character of the country. The entire peninsula lying between the head of Milne Bay and the extreme eastern limit of New Guinea at East Cape was then traversed. The district comprises some 150 square miles. A ridge 3000 to 4000 feet high runs through its entire length, with occasionally a level or rolling tract between it and the sea; the whole region is densely wooded, with a clearing here and there, the soil generally very fertile; large groves of coco-nuts occupy the level ground. The people do not build over the water, but on dry, well-chosen sites: the villages are clean and well laid out, surrounded by fruit trees and ornamental plants, and the spaces between the houses gravelled with basaltic or coralline shingle from the beach. Much difficulty is caused by the native views on the subject of murder, which is unpleasantly frequent. The crime is condoned (as among our own ancestors) by payment of a fine, which, in New Guinea, is very moderate in amount, and it is, besides, the community and not the individual murderer who is held liable. By a combination of great skill and determination, though at considerable risk, Sir William MacGregor succeeded in arresting and carrying off several of these murderers from the midst of their own people. In one case the young men were seen, after returning from their exploit, sitting in the village, being oiled and otherwise fêted by their admiring friends—all the sympathy, in short, being on their side, and coercion therefore hardly popular. In many of the inland villages of the territory one house is frequently built in a very lofty tree, for purposes of look-out or retreat. In one of these villages, Veiburi, at no great distance from Port Moresby, *all* the houses but one or two were thus built, one enormous tree sometimes containing two, and in one instance four such houses. The tribe was in process of extermination by a more powerful or anyhow more warlike neighbour, the Manukoro, and Sir W. MacGregor gives a touching picture of the condition of the survivors. Our advent in the country will, at all events, be welcomed when bringing redress to such cases as this, and we may hope much from the combined firmness and patience and conciliatory spirit which Sir W. MacGregor has always hitherto displayed, as well as from his long experience among a somewhat similar, though much less savage and treacherous race. We are glad to note, in the papers quoted, a restoration of many native names; thus Teste Island becomes Wari; Dinner Island, Samarai; Glenton, Bonarua; Heath Island, Logea; Hayter, Sariba, etc.

The last news from Sir William MacGregor reports that he had ascended the

Fly River about 200 miles; another 100 miles or so would bring him, it seems, to the Dutch frontier. He had a very narrow escape, for, his steam-launch having grounded, he was attacked by fifteen canoes—their hostility being due in large measure to the conduct of previous explorers. By the exercise of great skill and tact, however, Sir W. MacGregor made good his retreat without bloodshed. We hope shortly to receive particulars of the expedition.

## COMMERCIAL GEOGRAPHY.

**The Forth Bridge.**—On the 4th of March H.R.H. the Prince of Wales formally opened this bridge. Several schemes for bridging the Forth in the neighbourhood of Queensferry have been put forward during the last thirty years, and a pier was actually being built to form part of a bridge, designed by Sir Thomas Bouch, when the fatal accident to the first Tay bridge caused the railway companies to reconsider the whole subject. It was then that Messrs. Fowler and Baker designed the bridge which has now been brought to completion. At the place chosen for the site, the Forth is considerably diminished in breadth by a promontory, and the island of Inchgarvie lies conveniently in mid-stream. But on either side of the island are channels 1710 feet across, and more than 200 feet deep, in which it would be impossible to erect piers. The engineers therefore adopted the cantilever principle, which, though known for centuries, had never before been applied to bridge construction. If a stick be placed with one end against the foot of a wall, and be supported in an inclined position by a string attached to a nail in the wall vertically above its extremity, a simple cantilever will be formed, capable of holding a comparatively heavy weight suspended at a distance from the wall. It is evident that the string is in a state of tension, and that the stick is subject to longitudinal stress, and, further, that greater power is obtained by increasing the angle between the stick and string. The towers therefore, from which the upper members of the cantilevers of the Forth bridge start, are raised to a height of 343 feet above the piers, and about 200 feet above the railway lines, and these upper members are of lattice work, and the lower of tubular shafts, different kinds of steel being employed in the two cases, adapted to bear strain and thrust respectively. These members are also connected by tubular struts projecting outwards and upwards, and by lattice ties sloping downwards and outwards, thus dividing each cantilever into a number of smaller ones. The towers are formed of four cylindrical columns rising from piers forming a rectangle, 145 feet by 120 feet in the case of the northern and southern towers, and 260 feet by 120 in the case of the Inchgarvie group. These columns slope inwards, so that at the top they are only 30 feet apart, and the whole side of the cantilever shares in this deviation from the vertical, whereby it is less exposed to the direct action of the wind. The columns are connected together by struts and ties, and taper from 12 feet in diameter at the base to 5 feet at the top. The other cylindrical portions of the bridge are also of a tapering form. The great central double cantilever, supported by the Inchgarvie piers, is 1630 feet in length, and is nearly equal in size to two Eiffel towers placed base to base; the length of each of the other double cantilevers is 1510 feet. Between the centre and each of the side cantilevers spaces 350 feet long intervene, which are spanned by lattice girders 150 feet above high water. Hence the total space bridged over by the cantilever portion is 5350 feet, leaving 3545 feet to be crossed by viaducts. Many interesting details might be given, did space permit, concerning individual parts of the work, such as the caissons used to form the piers, where the depth was too great for masonry, etc. Here are a few figures relating to the construction.

Upwards of 21,000 tons of cement, 707,000 cubic feet of granite, and 117,000 cubic yards of Arbroath stone masonry were used in the foundations and piers, and the weight of the steel superstructure is 51,000 tons. The total painted surface is about 20 acres. The total cost of the bridge and the connecting lines of railway is about 3¼ millions sterling. Its stability seems to be beyond suspicion, for it is estimated to be capable of resisting a pressure of 56 lb. on the square foot, whereas, during the heavy gale of January 19th, the wind-gauges on Inchgarvie registered only 37 lb., and the maximum lateral movement of the great cantilever was less than one inch. The foundations were commenced in January 1883, and the last bolt was driven home in December last.

When the necessary lines are completed, Perth will be reached from Edinburgh in a little more than one hour, instead of two hours and seven minutes, the shortest time *vid* Stirling. The distance saved in the route from Edinburgh to Perth will be 21½ miles; to Dundee 31¼ miles; and to Aberdeen 28¾ miles. It is probable that trains will run from London to these towns in 9¾, 10½, and 12¼ hours, respectively.

**British Trade with Persia.**—The Hon. G. N. Curzon, M.P., has been contributing to *The Times* a series of admirable articles on the Persian Question. In one of these (March 3d) he treats of our trade with Persia, and sums up as follows:—"In the NW., N., and NE. zones of influence a decided Russian superiority is met, and in parts disputed by vigorous British or Indian competition. In the south zone British ascendency is firmly established, and is yearly increasing. In the west zone it already exists, and is likely to be strongly fortified in the near future. In the middle ground, the British have gained a solid *pied à terre*, and are gradually but surely extending their borders. The total value of English trade with Persia is given by 'Whitaker' as—imports into Persia £204,781; exports, £102,232—total, £307,013—figures which are so hopelessly beneath the mark as to make me wonder whether there is not a serious misprint. *The Statesman's Year Book*, quoting from Board of Trade returns, gives figures even more absurd—imports, £149,865; exports, £103,420—total, £253,285. A mere reference to the Consular reports from the Gulf will show that, in the three ports of Bushire, Lingah, and Bender Abbas alone, the imports into Persia from Great Britain are over £350,000, and the exports over £60,000. For my own part I think that the fairest calculations are those which reckon the Persian trade with Great Britain and India combined; and the total value of this I am disposed to place at £2,500,000 per annum. That a further development may be expected if road communications are improved, and still more if railways are introduced into Persia, alligned so as to assist the principal movements of trade, my letter upon Persian railroads will have shown. In the meantime the outlook is encouraging."

**Development of British New Guinea.**—Sir William MacGregor has written a letter to the Premier of Victoria on the future of this country. He does not consider that Europeans could form permanent settlements there, nor is there room for colonists, all the fertile land being already cultivated by the natives, who are not nomads like the Australian aborigines but settlers with clear ideas concerning their proprietary rights. Trade has been commenced on a small scale. A considerable quantity of *bêche-de-mer* and pearl-shell is exported, and copra and fruit may soon have a commercial value. About 700 or 800 miners are making a living by alluvial mining, and probably gold-bearing reefs exist, though none has at present been found.—*Chamber of Commerce Journal*, 5th December 1889.

**The Trade of Canada.**—*The Canadian Gazette*, 19th December 1889, states that the trade of the Dominion continues to advance. In the first four months of the fiscal

year the value of the exports was $46,816,464, being an increase of $8,200,000 as compared with the figures for the corresponding period of the year before. The imports amounted in value to $41,643,174, an increase of $2,587,000. Animals and animal products, fish, and lumber are the goods which have caused the increase, and will in some measure compensate for the diminished exportation of corn, a consequence of the smaller crops of 1889.

**The Economic Condition of Brazil.**—The *Times* of 29th November 1889 contains an article in which the financial and commercial prospects of Brazil are favourably spoken of. The budget increases annually: incomplete returns for the year 1888 show a revenue of $74,923,000, or nearly $200,000 in excess of the estimate, and the estimated revenue of 1889 is $79,488,000. There is, however, an annual deficit to be provided for by loans, but the credit of the country nevertheless is greater, for the last loan, of April 1889, was obtained on much more favourable terms than any of the preceding. The total amount of foreign and internal debt is about 103 millions sterling. That the country is able to bear such heavy burdens is a proof of the wonderful elasticity of its resources. It is now suffering from the effects of the emancipation of the slaves, owing to which about one-third of the coffee crop of 1889 was lost through deficiency of labour, and future crops will also be diminished from the same cause. A large current of immigration is therefore of the highest importance to the country. It is satisfactory to learn that the number of immigrants is increasing: in 1888 the number received at Rio and Santos was 131,268, while in the ten years ending 1884 it was only 228,407. In 1889 the Government was authorised to expend $5,500,000 in promoting immigration. Another important work is the construction of railways, and the increase in expenditure and debt is partly due to liabilities incurred in promoting these undertakings. There are at present nearly 5700 miles of railway in operation. Most of the prosperous railways are in the province of San Paulo, but they have certainly contributed in other provinces also to stimulate production and promote progress. The foreign trade of Brazil during the year 1886-7 amounted to $212,816,250, of which the share of the port of Rio was $93,881,234. The principal article exported from Rio is coffee. Cotton goods are the chief manufacture, and are sold in the country only. Brewing is an important industry, and the preparation of dried beef is also carried on in Rio Grande do Sul, but the Brazilian establishments are unable to compete with those of the river Plate.

## MISCELLANEOUS.

The contract for the construction of the **Congo Railway** has been published. The line is to be in working order on December 31, 1894.

The **Italian Possessions on the Red Sea** have been united into a colony bearing the name of "Eritrea," and have been placed under the administration of a Military Governor.—*Boll. Soc. Afric. d'Italia* 1889, (xi. xii.).

**Dr. Bastian**, Director of the Museum für Völkerkunde in Berlin, is making an ethnographical tour, which is to extend over two years. He visited Russian Turkestan first, and at the end of December he was at Lamu. From Africa he will proceed to British India.—*Globus*, Bd. lvii., No. 4.

Lieutenant Jaime has descended the river Niger to Kabara, the port of **Timbuktu**. He left Kulikoro on the 16th of September 1889, with two gun-boats, the *Niger* and the *Mage*. The whole voyage lasted about a month and a half.—*Compte Rendu* of the Paris Geographical Society, 1889, No. 14.

The *Times* of 29th November 1889 reports the discovery of very rich **Coal Seams in Gipps Land**, Victoria. Specimens of coal, taken from a seam 2½ feet thick, have been examined and found to be equal in every respect to the best Newcastle coal of N. S. Wales, on which colony Victoria has chiefly depended hitherto for her supply.

*The Boll. della Società Africana*, Naples, November-December 1889, notices a remarkable increase in the **Commerce of Aden** during the last financial year, 1888-89. The total value of the exports and imports was £4,689,570 as against £3,690,209 in the preceding twelve months, or an increase of nearly 26 per cent. This is chiefly due to increased importation of European and American thread and woven goods, particularly American cotton cloth, into Africa and Arabia, and larger shipments for Europe of coffee, cereals and gums.

An **Antarctic Expedition** is being organised under the direction of Professor Nordenskiöld. The necessary funds will be provided by the Royal and the Royal Geographical Societies of Victoria and Mr. Oscar Dickson. M. Nordenskiöld purposes to collect materials for a study of the fauna and flora of the Antarctic seas, to obtain specimens of the larger mammals, and to bring back impressions of the magnificent Tertiary flora, the remains of which have been proved by former expeditions to exist in the basalt of those regions.—*Compte Rendu* of the Soc. de Géographie, No. 3, 1890.

## NEW BOOKS.

*Problems of Greater Britain.* By the Right Hon. Sir Charles Wentworth Dilke, Bart. In Two Volumes (pp. x., 596 and 618, with Maps and Indexes.) Macmillan and Co., 1890. *Price* 36s.

The *Problems of Greater Britain* are many and hard to solve; but they are neither primarily nor prominently geographical. The work is not even, as might appear, a collection of questions and answers to questions. If the author had availed himself of the good old privilege, not wholly inconvenient, of appending a second descriptive and epexegetical title, the title-page might have run somewhat as follows: '*The Problems of Greater Britain*: being an account of the recent history, institutions political and municipal, and party politics of the principal Colonial possessions and Dependencies of the United Kingdom in North America, the West Indies, South Africa, Australasia and India, and of their present position whether as regards finance, productions, agriculture, manufactures, trade, railways, religious systems, education, literature, or art; together with a description of the best means for their defence, naval and military, both severally and collectively; as also materials for estimating the advantages, difficulties and possibilities of their closer union either in local groups or in one imperial federation with the Mother Country."

In the two solid volumes there is, of course, a good deal of geography in the narrower sense. In discussing an empire with an area of nine million square miles, or of nearly three Europes, with revenues amounting to some two hundred and ten millions sterling, and half the sea-borne commerce of the globe, it is inevitable that many geographical facts of importance should come up for discussion which are not commonly known. Few people remember which of our great proconsuls are charged with the administration of what Sir Charles calls "dependencies of dependencies"—of Perim, the Laccadives, the Kermadec Islands, Lord Howe Island,

Chatham Island. Most of us, informed that Pahang is one of the last of a group of states to come under our protectorate, will be considerably enlightened on being told in what part of the world Pahang is to be found. And the best instructed of readers would regard it as a severe test of his geographical knowledge if, even after reading the section on the defence of the North-West Indian frontier, he were asked to locate on a blank map the names which Sir Charles uses freely and familiarly—Chaman, Bori, Giriskh, Gwadur, Zhob, Kalabagh, Lalla Musa, Loralai, Tochi, Bannu, Nushki. It would be difficult to find anywhere a more succinct and complete statement, brought up to the latest date, of our complicated relations with the Empire of Bechuanaland (more British and less British), Matabeleland, Mashonaland, Swaziland, and Tongaland; of the Lower Niger, the British East African Company, and British New Guinea. But for the most part the discusser of problems is content with very general sketches of the climatic and physical features of our colonies, and then mainly as regards their suitability as homes or settlements for industrious Anglo-Saxons. Generally these sketches are eminently lucid: sometimes decidedly picturesque—as, for example, the contrast drawn between the scenery of Australia and New Zealand (pp. 429-431).

For Sir Charles Dilke, Herodotus is the father of geography. A saying is quoted in the book that in Australia there is little to see save the people who live there; and whether or no Sir Charles adopts this statement as his own, it is evident that all through, whatever else there is to see, the thing of supreme interest for him in a country is the people, their opinions, strivings, customs, prospects, and the leading personages amongst them. In few works on over-sea lands is the subject more completely *quidquid agunt homines*. The author tells us exactly what he thinks (and we think) of most interest for us homekeepers to know; whatever is most necessary to enable us to read with intelligence Colonial news and Colonial newspapers; what would be most helpful to prepare one beforehand for making himself in some measure at home if called on to sojourn or settle in one of the Colonies; and for understanding what he heard and saw about him when he got there.

The work is a manual of the political and military geography of the Empire and in that department is of first-rate importance. In reading the *Problems* one has a growing feeling that in order to give us such a mass of well-ordered, well-digested information the author must have gone through enormous labour in amassing and thoroughly sifting the best and most authoritative books, pamphlets, articles, printed speeches, and reports; and in his three journeys round the world have made the best use of his own eyes and ears, of his acute intelligence and diplomatic tact, and 'interviewed' to good purpose persons of every shade of widely differing opinions. It further becomes increasingly plain that, unlike some recent writers on the subject, Sir Charles did not go forth with certain cut-and-dry theses to maintain, did not merely seek and find support for these same theses, and on every occasion reiterate them in slightly varying forms. He has evidently done his best to give us materials for forming our own opinions, neither exaggerating the *pros* nor minimising the *cons*; and though he does not obtrude his own views unduly, he is not chary of stating frankly his own conclusions on the most important questions. Thus, on the question of the military strength of the Empire, he holds that our resources are enormous, and that it would not probably be so easy to ruin and starve Great Britain by a combined and universal process of investment as is sometimes argued; but he points out how much remains to be done everywhere both by our colonists and ourselves in organising our strength, and what vast risks are run so long as this is not accomplished. On another great subject justly much discussed on platforms and in the press, Sir Charles sees no reason why the South African Colonies should not federate, as the Canadian Dominion has done, in a

spirit of strong and increasing friendliness to Britain ; shows how protection and the tariff are the chief hindrances to Australian federation ; but indicates very fully what and how great are the difficulties in the way of Imperial federation from the points of view of very various colonial schools of thought.

The two close-packed volumes are extremely interesting, but not easy reading. Where the institutions of so many countries are described in detail, where resemblances are as numerous as contrasts are decided, an effort is required to follow intelligently, and it may be impossible to retain in memory all the facts one could wish. But it is impossible not to acquire and carry away a great wealth of sound and probably novel knowledge of colonial things and of the persons who are among the chief factors of colonial politics and thought. We may fail to remember in which colonies the relatives of intemperate persons may with the help of the magistrate intimate to all liquor-sellers that they must under no circumstances sell intoxicants to such intemperate persons, on pain of heavy damages ; in which others local option or prohibition is enforced ; and in which the high licence system is relied on. But we are compelled to realise how on this and very many other subjects we have in our colonies most valuable laboratories of administrative and legislative experiment, fitted up regardless of expense and equipped with all the newest apparatus. It may be too much to expect that we can recollect all the various systems of land laws ; but we learn that, according to Sir Charles Dilke, there is hardly anywhere any considerable tendency to land nationalisation ; and that revolutionary Socialism has less hold on the most democratic of our colonies than on Great Britain itself. Though not easy reading, the volumes are everywhere readable, and this though the style is generally rather dry and matter of fact. They might be recited to an audience even—so far has the author contrived to avoid the resemblance, so apparent in most works on the Colonies, to the admirable Colonial Office List. We are not stupefied by rows of tables and figure-studded paragraphs. By round numbers and judicious comparative statements he has managed to serve his purpose and secure our enlightenment even without printing such collections of figures and tables in an appendix ; for which the reader is grateful, and the permanent value of the book, in its kind, is not injured. The book is emphatically one to read and one to keep for frequent reference.

In speaking of Sir William Hunter, Sir Charles Dilke says he is trustworthy on all points but the spelling of Indian names. We are not sure that we recognise the superiority, on this head, of the system adopted by Sir Charles, which is neither quite the vulgar way nor quite the "official." Thus we have *Hyderabad* and *Karachi*, *Khyber* and *Multan* (on the India map, *Multa*). On the same map the capital of Baluchistan is spelt both *Khelat* and *Kelat*, which is not advantageous ; we doubt if *Kafristan* is advisedly so spelt (*passim*) ; and Abdurrahman should not appear in the index as *Abdurraham*. *Ballarat* and *Paramatta* are retained instead of the now accepted Ballaarat and Parramatta. *Nordenfelt* is a less usual form than Nordenfeldt ; and the odd but old-established mongrel word Stadtholder is not improved by being made *Statholder*. But the book is admirably printed ; and the maps though slight are serviceable.

*The British Empire.—Part I., The Home Countries: England, Wales, Scotland, and Ireland.* By W. G. Baker, M.A. London : Blackie and Son, 1889. Pp. 190. *Price* 2*s*.

A successful career as a school-book may be safely predicted for Mr. Baker's new volume. The British islands are described clearly, simply, and with much picturesqueness. Statistics are few and carefully rounded. There is an entire

absence of the repulsive element, once the one thing we could count upon meeting in a geographical text-book. Maps and illustration add to the usefulness of the book, which is further enriched by plentiful quotations from racy magazine articles, and selections from the impressions made on literary Americans and Frenchmen when visiting the country.

*A Contribution to the Flora of Derbyshire: Being an Account of the Flowering Plants, Ferns, and Characeæ found in the County.* By the Rev. W. H. Painter. London: George Bell and Sons. Derby: E. Cenlow, jun. 1889. Pp. 156.

This work is made up of an introduction, lists of plants, and indexes—all being, in their own way, excellent. The lists are copious and well arranged, with authorities cited, and, where necessary, quotations from previous botanical writers, or original remarks appended. The author divides the county into districts according to the prevailing geological features characteristic of each, and by reference numbers to these added to the description of each plant, a very satisfactory view of the local geographical distribution of the flora is afforded. There is a clear map of the county by Bartholomew, and the full indexes make reference easy.

*Devia Cypria: Notes of an Archæological Journey in Cyprus, with Map and Illustrations.* By D. G. Hogarth, M.A. London: Henry Frowde, 1889.

*Devia Cypria* is a somewhat pedantic title for a report of some objects of archæological interest seen during the later months of a visit by Mr. Hogarth to the hitherto less systematically explored districts of Papho and the Carpass in Cyprus, to which he had been sent, as the holder of a Craven Travelling Fellowship, by the committee of the exploration fund. Along with Mr. M. R. James and "others," he conducted excavations "for several months at Leontari Vouno, Old Paphos, and Amargetti, and the results obtained from these several undertakings have been already published" in the *Journal of Hellenic Studies*. With the exception of these topics, the author describes his volume as "a mere traveller's journal in substance, if not entirely in form; and as no more than that—as not aiming for one moment to be exhaustive on any branch of Cyprian archæology—I now offer it to any one interested enough in Cyprus to peruse its pages."

Mr. Hogarth writes as if his readers ought to have all the historical and geographical notices of Cyprus at their finger-ends: no effort is made to carry them with him by any detail or even reference to the history of the kingdoms of Paphos, Kerynia, or Salamis, or to towns mentioned, beyond their names: the map attached covers only the north-east horn of Cyprus, or the Carpass; while the first half (nearly 52 pages out of 119) relates to the Papho district in the south-west. Much of the contents, however, is interesting to the classical geographer and the Greek epigraphist; and the author has very justly exposed the unscientific and inaccurate character of General di Cesnola's work in Cypriote archæology. There is an index, but the first attempts to test it—by Erythra, St. Epaphras, and Agapenor, on page 4—were failures.

*Pen and Ink Sketches from Naples to the North Cape.* By Emily A. Richings. London: Digby and Long, n.d. Pp. 128. *Price 2s 6d.*

A collection of brief essays describing some of the most interesting sights in Italy, including Capri, Rome, Pisa, and Milan. Accounts are also given of a journey across the Great St. Bernard, thence to Nüremberg, Munich, and Copenhagen. A voyage to the icy regions of the North Cape is the subject of the concluding chapter; and the authoress writes brightly and graphically throughout, avoiding personal gossip.

*The Bible and Modern Discoveries.* With Map and Illustrations. By Henry A. Harper (Palestine Exploration Fund). Demy 8vo, pp. xx and 538. *Price* 16*s*.

Few Societies have done better work than the Palestine Exploration Fund Committee, with the able officers who have worked for them. It is sufficient to name only Colonel Sir C. Wilson, Colonel Sir C. Warren, Major Conder, Lieut.-Colonel Kitchener, Professor E. H. Palmer, Professor E. Hull, G. Schummacher, and G. Armstrong. Their researches have thrown a flood of light on the ancient geography of the Holy Land, rectifying in scores, if not hundreds of instances, the traditional identifications of sites, whereby floods of fresh light have been thrown on the Bible narrative. They would even have completed a trigonometrical survey of the whole country but for the infatuated obstructiveness of the Turkish Government which put a stop to it.

Mr. Harper is "an artist who has painted the lands of Palestine, Sinai, and Egypt," and in the words of Mr. Besant, the honorary secretary to the Fund, who supplies the short Introduction: "In this new work the author has attempted a thing hitherto untried. He has taken the sacred history, as related in the Bible, step by step, and has retold it with explanations and illustrations drawn from modern research and from personal observation."

Notwithstanding either careless punctuation—the use of "periods" for "commas"—or else of occasional sentences without a finite verb, the book is written in a bright, clear, and eminently interesting style. It runs over the Bible history from Genesis, ch. xi., to the end of 2 Chronicles, noting the chief points that have been illustrated by recent discovery, the meaning of names, the identification of sites, etc. The Arabic names have been corrected, we are told, by the Assistant-Secretary, but either the method of transliteration is peculiar or the proofs have not been revised. The map also unfortunately includes the whole Sinaitic Peninsula and Egypt, as well as Palestine—that is, an area of about 440 miles from north to south by 400 miles from east to west—and not being a large one, Palestine is crowded into a fourth of it, and is far too small for reference. That area ought to have been mapped to at least double the scale to be of any real use. The illustrations, of which there are twenty-nine, partly reproduced from Colonels Wilson and Warren's volume, are good and interesting: it would have been well to have given more of them. In spite of a slip or two as to facts, and an occasional positive assertion where there is room for difference of opinion, the volume is very valuable and thoroughly well-deserving of careful perusal: it is for popular reading, and the author has succeeded in making it interesting and instructive. It may be heartily recommended to all readers.

*The Canaries for Consumptives.* By E. Paget Thurstan, M.D., B.A. London: W. H. Allen and Co., 1889. Three Sketch Maps. Pp. 98.

Many more pretentious volumes on this subject contain less useful information than the modest little contribution of Dr. Thurstan. The author not only gives one a capital bird's-eye view of Gran Canaria, and Tenerife, but enters into a scientific and trustworthy treatment of the climate and health-value of the Canarian archipelago. His criticisms and opinions are sound and just. He is, however, wrong in referring (p. 16) to the *Roaring Forties* being found to the north of the Equator: they are, on the contrary, the "brave west winds," between latitudes 40° and 50° south of the Equator; and he is also incorrect in inferring that the hotel-keepers in the Canary Islands are exempted from import-duties, for they have to pay heavy dues on wines and spirits, for instance.

*A Winter Tour in South Africa.* By Sir Frederick Young, K.C.M.G. London: E. A. Petherick and Co., 1890. *Price 7s. 6d.*

The author is a Vice-President of the Royal Colonial Institute, who narrates his impressions during a tour of a few months in the summer of last year. His travels took him through an extensive tract of country from Cape Town to Natal, over which he journeyed sometimes by railroad and sometimes by wagon. Most interesting information can be gleaned from his descriptions of the various towns through which he passed, such as Kimberly, Johannesburg, Pretoria, Durban, etc., as well as from the accounts of diamond and gold mining, farming, stock-raising, etc. This information is all the more valuable from the fact of its having been collected so recently. At Pretoria he meets President Krüger. In conversation with him he expresses a hope that railways will soon penetrate the Transvaal in every direction. "The President smiled at my strongly-expressed aspiration, but did not give me any other reply." There are chapters on climate, the native question, railways, colonisation, the political situation, etc. The book is well got up, and is illustrated with ten excellent photographs.

*South Africa; and How to Reach it by the Castle Line.* By Edward P. Mathers, F.R.G.S. With Map and Illustrations. London: Waterlow and Sons, Limited, 1889.

Messrs. Donald Currie and Co., the well-known managers for the Castle Mail Packets Company, have issued a *brochure*, appropriately bound in white and gold, which they are offering to the public as a "comprehensive and easily read guide to the land of gold and diamonds." They have secured the services of the editor of *South Africa* in its compilation, and the statistics are taken from official sources. The information it contains, although necessarily brief, is practical. Notes on the various ports of call of the Castle Liners are given; and one section, entitled "The Class to Emigrate," is specially useful, as it contains an excerpt from a recent Blue-Book, with tables of wages, rents, prices of food, etc. The numerous illustrations give a fair idea of colonial townships, and a map of South Africa is also supplied.

*Picturesque Alaska: A Journal of a Tour among the Mountains, Seas and Islands of the North-West from San Francisco to Sitka.* By Abby Johnson Woodman. Boston and New York: Houghton, Mifflin and Co., 1889. *Price 5s.* Pp. 212.

Alaska has other attractions besides its mineral wealth and its fishing-grounds. The steamboats which ply along the coast northwards from San Francisco carry with them tourists to visit the scenery of the Alaskan bays and shores. The writer of this book—an account of a tourist's trip—is a lady. She possesses quick powers of observation and of admiration, and an enthusiastic temperament, though she is able to curb her enthusiasm in such a way as to give to her narrative movement and speed. These qualities come out best in the part that deals with the actual steamboat voyage along the coast of Columbia and Alaska. The scenery through which the vessel passed apparently resembles in many respects that of the fjords on the west coast of Norway; but it has not the sternness and severity of the latter, an effect which would seem to be principally due to the greater quantity of timber vegetation. The resemblance of that part of the world to the coast of Norway is further borne out by the fringe of islands that fence the shore and protect it against the Pacific, by the glaciers and waterfalls that come down to the sea from the mountains, and by the villages that cling to the foot of the cliffs (see the engraving of Juneau on page 145, and that of Sitka on p. 165). The concluding portion of the book, treating of the Indian settlements and towns, and

the life of the Alaskan shores, is neither so vivid nor so interesting as the descriptions of scenery. By the way, the *teredo* (p. 153) is not an insect, but a mollusc. A slip occurs on p. 61: "unbroken by neither sign nor ripple" is an unnecessary double negative. The diction is in a few places decidedly American. The illustrations are useful; though that of Mure glacier fails to do anything like justice to the subject. The map is not altogether a pleasing object to the eye, cut as it is into three sections. Surely the little book, though prettily enough printed and bound, is rather expensive.

*The Constitution of Canada.* By J. E. C. Munro, of the Middle Temple, Barrister-at-Law, Professor of Law, Owens College, Victoria University. Cambridge: At the University Press, 1889. Pp. 356. *Price* 10*s.*

This work forms the first of a series in which the author proposes to survey the legal aspects of the Constitutions of the British Colonies. These colonies, for the purpose he has in view, he arranges in the four following groups:—(1) The North American group; (2) the Australian; (3) the South African; and (4) the Crown Colonies. He has found it necessary, before taking a general survey of the constitutions of these groups, to examine each of them in detail, and has selected Canada for first treatment, both because its constitution has of late years formed a prominent topic in political discussions, and because the Dominion system of government has now attained a completeness it did not previously possess. In surveying this constitution he limits himself to a description of its nature without attempting to criticise its working. As regards his method of treatment he has preferred, he says, to work upwards instead of downwards, and thus we find that in his account of the existing political institutions he begins with those that are local or provincial, and ends with the central government. Similarly, in describing the legal system, he begins with the legislature, which enacts laws, and ends with the executive and the judicature, which concern themselves with their administration and enforcement. This is obviously the best method he could have selected. At all events, in following it, he has presented his readers with an exposition at once lucid and succinct of a great mass of materials of a very intricate and complex nature. The work will be an especial boon to such as are interested in the politics of the day, and wish to learn from an authoritative source the precise nature of the relations which subsist between the British Crown and the Dominion, and between the Dominion itself and the provinces of which it is constituted. At the same time the merits of the work cannot fail to procure for it a high and permanent place in the department of legal literature to which it belongs.

*Trooper and Redskin in the Far North-West: Recollections of Life in the North-West Mounted Police, Canada, 1884-88.* By John G. Donkin. London: Sampson Low and Co., 1889. Pp. 289. *Price* 8*s.* 6*d.*

An interesting and well-written account of the desolate regions north of the Canadian Pacific Railway. Mr. Donkin was in the mounted police during Riel's rebellion, and narrates several stirring scenes. He graphically describes a mid-winter sleigh-ride of 300 miles, with the thermometer on the Saskatchewan registering 94 degrees below 32° F., when "the atmosphere was clear and bright, but cutting as the keenest steel." Several of Mr. Donkin's companions were fatally frost-bitten. He states that this "Arctic climate in winter is the one drawback to this magnificent land," and that their sentries had to "dispense with their carbines, as the metal would freeze their hands." A man who had resided forty years on the Saskatchewan informed him that he had only known wheat escape frost five times during that lengthened period. Mr. Donkin, however, observes that "the

zone of the Saskatchewan Valley is a magnificent grazing country." A good map is given, showing the provisional districts of Assiniboia, Saskatchewan, and Alberta, with the Mounted Police stations and patrols throughout the North-West Territories.

*The Indians: Their Manners and Customs.* By JOHN M'LEAN, M.A., Ph.D. (ROBIN RUSTLER). With eighteen full-page Illustrations. Toronto: William Briggs, 1889. *Price*, $1.00.

Readers of the books of Fenimore Cooper and Gustave Aimard have been familiarised with many extraordinary names and curious customs connected with the wild tribes of the North-Western Provinces of Canada, without holding any definite views as to their ethnology. Dr. M'Lean gives us in this little book a systematic treatise, based upon a nine years' residence among the Blood Indians, which explains much that has remained a mystery to the outsider regarding these warriors. Their curious traditions, social customs, and strange nomenclature have each a distinct meaning attached to them, which we are sometimes apt to treat as merely ridiculous or fanatical. Chapters VIII., IX., and X. give practical suggestions with regard to the civilisation, and consequent Christianising, of the Indian race. Dr. M'Lean does not lose sight of the many difficulties which oppose the pioneer of reformation, but he does not indulge in empty platitudes regarding the certain triumph of the energetic "pale-face." He says (pp. 262-3), "There must of necessity be the training of the Indian towards self-support, salvation from a life of pauperism, and the begetting of a love for honest labour. . . . As the white man's civilisation grows, sympathy and liberality are begotten in the just appreciation of the work that belongs to every individual, tribe, or race." The book is deserving of attention. It is furnished with good illustrations.

*The East Coast of South America, from Cape Orange to Cape Virgins.* Compiled by LIEUTANANT J. C. FREMONT, U.S.N., and R. H. ORR. Washington: Government Printing Office, 1889.

These sailing directions are full of interesting geographical information regarding the coast and coast towns of eastern South America. The description of the Falkland Islands and the outlying groups towards the South Shetlands is particularly valuable.

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## NEW MAPS.

### AFRICA.

**BAMMAKO AU GOLFE DE GUINÉE**, Itinéraire de ——, à travers les Pays de Kong et du Mossi, levé et dressé par le Capitaine L. G. Binger, 1887-89. Echelle, 1 : 2,500,000. *Bulletin de la Société de Géographie 3me Trimestre* 1889.

**TOGO-LANDES**, Wegeskizze der von Pr.-Lt. Kling ausgeführten Reise in dem deutsch-französischen Grenzgebiete des ——. Massstab, 1 : 185,000.
*Mitt. von Forschungsreisenden und Gelehrten aus den Deutschen Schutzgebieten. Band II., Heft* 4. *Berlin; A. Asher & Co.*, 1889.

**USAMBARA**, Originalkarte von ——. Nach eigenen Aufnahmen während der Dr. Hans Meyerschen Expeditions, construirt und gezeichnet von Dr. Oscar Baumann. Massstab, 1 : 400,000. Nebenkarte: Strecke von Lewa bis Magila, 1 : 200,000. *Petermann's Geographische Mitteilungen, Jahrgang* 1889, *Tafel* 16. *Gotha: Justus Perthes.*

**WESTLICHEN KOMOREN**, Die ——. Nach den Aufzeichnungen von Dr. K. W. Schmidt und älteren Quellen gezeichnet von Paul Langhans. Massstab, 1 : 333,333.
*Petermann's Geographische Mitteilungen, Jahrgang* 1890, *Tafel* 1.
*Gotha : Justus Perthes.*

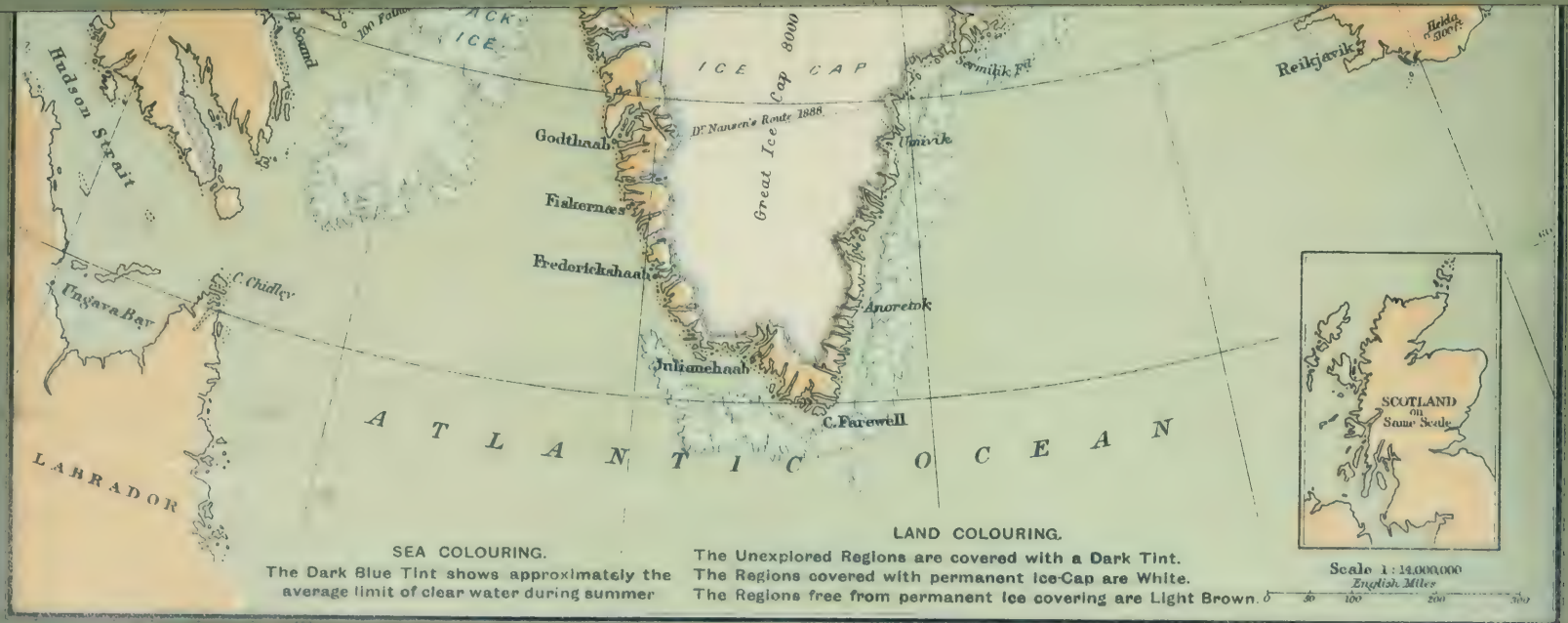
**ZOUTPANSBERG UND BONJAÏ**, Kartenskizze von ——. Gezeichnet von C. Knothe, 1889. Massstab, 1 : 2,000,000.
*Petermann's Geographische Mitteilungen, Jahrgang* 1890, *Tafel* 4.
*Gotha : Justus Perthes.*

**TRANSVAAL, OR SOUTH AFRICAN REPUBLIC**, Map of ——, and surrounding Territories, by Fred. Jeppes, F.R.G.S., etc. Pretoria S.A.R., 1889. Scale, 1 : 1,000,000, or 15·78 to the inch. *London : Dulau and Co.*

The recent announcement of President Krüger having changed his mind in favour of the construction of the Cape Railway from Bloemfontein to Johannesburg, gives us the opportunity of drawing attention to Fred. Jeppes' new map of the Transvaal. This excellent map embraces not only the South African Republic, but also the Orange Free State, Swaziland, Tongaland, the northern part of the Cape Colony, including Griqualand East and West, Natal and Zululand Protectorate, a portion of Pondoland, British Basutoland, the eastern portion of Bechuanaland, the southern part of Matabeleland, and the Portuguese Possessions east of the Transvaal. The De Kaap, Witwatersrand and Zoutpansberg gold-fields are given as inset maps on double the scale (1 : 500,000) of the general map, to which a plan of Pretoria and suburbs on the scale 3200 feet to 1 inch has been added. All these insets are reduced from Troye's maps. The extensive new *data* of which the compiler has made use are the official surveys of the different countries and colonies mentioned in the title. The recent astronomical positions and work of the British Boundary Commissions, which were in the hands of the author, have shifted the whole of the Transvaal to the West. Since the development of the gold-fields and the increase of the European population by immigration, a re-arrangement of the districts and the establishment of new towns and villages have taken place, so that none of the existing maps of that country are now of much use. The map indicates, in addition to the political boundaries of the districts and sub-divisions, the proclaimed gold-fields, places where gold is found and mines are worked, railways, main roads and postal routes, mission stations and Kafir kraals. The altitudes are given in English feet. The map has been engraved on copper, and is altogether an exceptionally good one and worthy of special commendation.

**SOUTH AFRICA**, Juta's Map of ——, from the Cape to the Zambesi. Compiled from the best available Colonial and Imperial information, including the official Cape Colony Map by the Surveyor-General, Cape Town, Dr. F. Hahn's Damaraland, and F. C. Selous' journals and sketches. New and revised edition.
*Published by Juta and Co., Cape Town*, 1889. *London : E. Stanford.*

The extension of British influence northwards over Khama's country and the Matabele kingdom has again attracted European attention to this part of Africa. We therefore welcome this new and extended edition of Juta's well-known map of South Africa, though one might, perhaps, have liked to see the map extended still farther to the north, towards Lake Tanganyika, so as to show the Scottish Mission Stations on Lake Nyassa. The most recent *data* have been employed. In the South African Republic the new districts of Ermelo, Pietretief and Vryheid have been added, while the outline has also been corrected. The names are drawn partly in curves, partly parallel with the degrees of latitude, giving the map a somewhat crowded appearance, although the large scale chosen might well have been expected to afford space for more detail.



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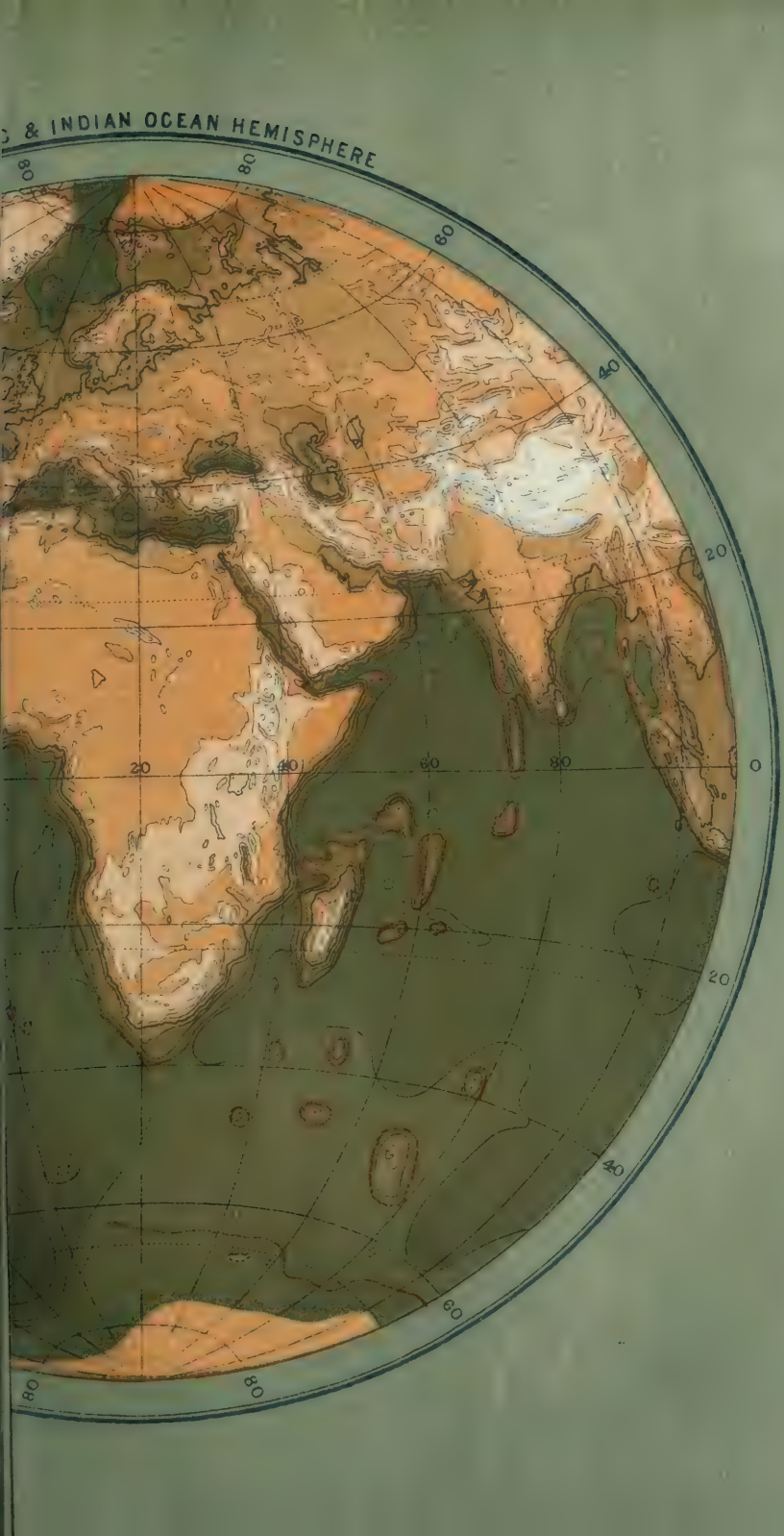
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THE VERTICAL RELIEF OF
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EXPLANATION
OF COLOURING

# THE SCOTTISH GEOGRAPHICAL MAGAZINE.

## SCANDINAVIA: THE VIKINGS AND THE GEOGRAPHY OF THEIR TIMES.

*(Read at Meetings of the Society, Edinburgh and Branches, April, 1890.)*

By Paul B. Du Chaillu.

The Viking Age may be said to have commenced towards the beginning of our era, gradually dying away towards the end or middle of the thirteenth century. The so-called Saxon expeditions during the Roman period were Viking expeditions in every respect. For nearly twelve centuries the maritime tribes of the North held supremacy over the sea: from that time their descendants—first the Dutch, then the English—have followed in their footsteps.

No historical records that have come down to us can compare with the naval history of the Norsemen, or Vikings. The people of Greece, Carthage, or Rome, in the height of their power, never showed the maritime qualities that were embodied in the Norse character, nor has there ever been a nation holding supremacy for so long a period over the sea as the people of the North. The earliest Roman records of the seafaring tribes of Norsemen, called Saxons by them, show that the power of Rome at its zenith was unable to cope with their might.

Throughout the Sagas we notice that the Vikings were a colonising people,—a hereditary trait seen in their most direct descendants, who are living in Britain.

Britain, being an island, could only be colonised by a seafaring people. No conqueror has obtained mastery over a large aboriginal race without continuous wars; and, we may add that, the aggressive nation which has taken permanent possession of a country is superior in intelligence and civilisation to the conquered race. Living examples of this axiom surround us in every part of the world to-day. So the Norse

invaders of Britain were superior to the conquered race of Britons, as is easily shown by their archæology.

Before proceeding further, let us take a retrospective view of the country the Norsemen inhabited, viz., the present Scandinavia. We see the rock-bound coast of the large peninsula which includes Sweden and Norway—a coast surrounded and protected by tens of thousands of islands and islets, and indented everywhere with fjords, bays, and creeks: in many places the oak, the fir, and the pine flourish now as in the days of old. There is the long peninsula of Jutland, the western coast of which, devoid of harbours, precludes it from ever becoming a maritime country. Then we have the Cattegat, and the great basin of the Baltic, with its large islands, such as Funen, Zealand, Bornholm, Oeland, Gothland.

The earlier antiquities, including a great number of graves, testify to a dense population. On the eastern coast of Jutland, and upon the islands of Funen, Zealand, and others, fjords afford good shelter for large fleets.

The above description affords a bird's-eye view of the home of the Vikings. But you may ask me, first, How do you know that the country you have described is that of the Vikings? I will simply state that it is, because it is there, and there only, we find relics of a dense, warlike, maritime, wealthy and civilised population in that early period, who knew also the art of writing. South of the Eider, at the mouth of the Elbe, or in Holstein, such proofs are totally wanting.

Let us now look over the different records that have come down to us.

We will first speak of the Sagas. These parchments give us a history of the North and of her chiefs. In reading them, we gather that even at a period anterior to the Christian era the people of the North were a seafaring people; as we go on, we find that they had powerful fleets: that they were great traders, and undertook great maritime expeditions—westward, southward, eastward. We have descriptions of their religion, we learn what kind of weapons they possessed, we read of their costly garments and jewels, of their dwellings, of their wagons and horses, of their ships, of their sails. We find that they knew the art of writing, and we have numerous accounts of their mode of burial. In a word, we have a most perfect record of their life from the cradle to the grave.

We are rather staggered at such literature, which is quite contrary to preconceived notions, for very crude and mistaken ideas have long prevailed concerning these Norsemen, who overran and settled in Western Europe and became the progenitors of the great English-speaking community throughout the world. The old ideas, which have for many years held sway, were derived from hostile and prejudiced sources, and have been adopted by one historian after another; and, on looking for proofs, we find that the commonly received account of the early history of the settlement of Britain is not supported by any evidence. Leaving the Norse records, let us come to those of the Romans and Greeks, which speak of the maritime tribes of the North.

The earliest of the maritime tribes of the North mentioned by the Roman writers was the Sueones, the Sviar of the Sagas, which inhabited the Svithjod of old—part of the present Sweden. Tacitus, about

the end of the first century, describes their ships in the following manner:—"Hence, the states of the Sueones, situated in the ocean itself, are powerful not only on land, but also in their fleets. The shape of their ships is different, in that, having a prow at each end, they are always

GEOGRAPHY AND NOMENCLATURE OF THE VIKING AGE

(From *The Viking Age*; by the courtesy of the Publishers.)

ready for running on to the beach. They are not worked by sails, nor are the oars fastened to the sides in regular order, but are loose as now on some rivers, so that they can be shifted here and there as circumstances may require."

"The states of the Sueones are situated in the ocean itself," says Tacitus, which implies that he had heard that they were surrounded, or almost surrounded, by water—a description that applies perfectly to the country which I have described to you as the home of the Vikings, viz. Scandinavia. My hypothesis, given in *The Viking Age*, that

the Veneti of Cæsar were probably the advanced guard of the North, is based upon the fact that their ships, as described by Cæsar, correspond in a remarkable manner with the ships of the Norsemen.

After the days of Tacitus the name of Sueones is not found in the Roman records, and is not heard of again until it appears, some centuries later, in the Frankish records, where it is very prominent. They and the Danes are mentioned as seafaring people in those times.

If the Sueones were powerful in the time of Tacitus, they certainly must have been powerful before, and their power could not suddenly disappear. Nations do not become mighty in one day nor in one generation, neither do they decay and disappear in a moment: the moral causes that bring about the decay of nations are slow, as well as the causes that produce their gradual rise.

Now, looking at the map of Europe, are we to suppose that the mighty fleets and merchant-vessels of the Sueones did not sail farther than the coasts of Gaul and Britain?

After Tacitus, two new names are given by the Romans to the maritime tribes—Saxones and Franci. Their country, like that of the Sueones, is unknown to them; they are said by some writers to live "above the Rhine and Western Sea."

Henceforth all the maritime tribes of the North are only known to the Romans under the names of Saxones and Franci; there are no more Sueones; and for nearly three centuries—that is, until the overthrow of the Roman Empire—they continue to pour their countless hordes over Western Europe, and even sail as far as the Mediterranean. After the overthrow of Rome, history becomes a blank, but in the Sagas we discover no gaps, no stoppage in the seafaring life of the people.

The question arises: Can we believe that such vast and inexhaustible masses of people, who swarmed upon every sea, who had a country of their own, who died and were buried in its ground, would leave no trace whatever behind them, and that if they had ever inhabited the mouth of the Elbe and Holstein, no traces would be left there of such population? This would be directly contrary to all our previous knowledge.

The great genius of Gibbon, who could not altogether shake himself free from the Saxon name and legends, almost discerned the true facts, as it were by instinct, when he wrote: "This contracted territory, the present Duchy of Schleswig, or perhaps of Holstein, was incapable of pouring forth the inexhaustible swarms of Saxons who reigned over the ocean, who filled the British Isles with their language, their laws, and their colonies. . . . . It would seem probable, however, that the most numerous auxiliaries of the Saxons were furnished by the nations who dwell upon the shores of the Baltic."

Where is the evidence, at the mouths of the Elbe, the Weser, and the Rhine, or in the south of Jutland, of the multitude of graves, of the remains of ships, burned and unburned, of weapons, and of other material traces of wealth, power, and skill—in short, of "an inexhaustible swarm" of people "who reigned over the ocean"? I myself have been there, but I cannot find them. I have, however, found them in Norway, and on the

shores and islands of the Baltic and the Cattegat, in the most abundant quantities.

We have various records which speak of the early maritime tribes of the North; but manuscripts can be falsified, interpolations may be added by later scribes: hence, this written evidence must be received with great caution, especially when neither date nor authorship can be traced. Every record that claims to be historical, in order to become authoritative, must be tested by the evidence of archæology.

In studying the history and antiquities of any country, which at some previous period has been overrun and occupied by a foreign power, we expect to find some material traces of the invader, in the shape of monuments, inscriptions, graves, weapons, ornaments, etc. Thus, Roman remains are plentiful in Germania, Gallia, Britain, etc., and in generations to come English remains will be found in India, to tell the tale of English rule, just as there are evidences in the United States of English occupation in former times, and in Canada of French occupation. History can only be based upon evidence; if evidence be lacking, it is not history, but simply hypothesis.

We have no proofs whatever that these seafaring people called themselves Saxons, nor that the tribes which settled in Britain called themselves Saxons or Angles. Nor have we a single evidence that Engeln ever meant England.

What was the origin of the word Germania? How came the name of my own country to be America? How came the name of Scythian to be used by the Greeks, and the name Greek by the Romans, or, in more recent times, the name of Tartars to be applied by ourselves to a number of Asiatic races, without regard to ethnic affinities? Do the Chinese call themselves Chinese, the Africans Africans? Was not a part of the population who settled in America thoroughly English? Still, they were called, and now call themselves, Americans. Were not the people who settled in Canada thoroughly French? Still, they were called, and now call themselves, Canadians. Certainly there was no part of Europe called America or Canada. I could give you a great many more similar examples.

Sir Edward Bunbury tells us:—"Many of the most important names of nations that appear in Tacitus are not found in Ptolemy, and in other cases it is uncertain whether the new names that appear for the first time in the later author represent a corresponding change in the population, or are merely new appellations for old tribes." The Frankish records name tribes that are never heard of again.

So, let us test the Sagas, and the Roman and Greek records of which I have spoken before, by archæology. What do we see in the old Norse lands?

Even before iron was known, in the time when bronze only was used, we note beautiful weapons of bronze, which neither Greece nor Rome could surpass in beauty of design. In the Iron or Viking Age, in the country I have described as the home of the Vikings, we find the land covered in many places with multitudes of mounds and graves, which can be counted by thousands and tens of thousands; their vast number can only be

accounted for by a teeming and overcrowded population, for these are only the graves of the powerful and the rich. We find in these graves, as well as in the ground and in bogs, a great number of weapons, gold ornaments, remains of ships, objects with Runic inscriptions, etc., showing that these Norse ancestors of ours were not barbarians, but a highly civilised people, pre-eminent not only in the science of war but in all the arts of peace.

At the period of Tacitus, and in some of the centuries that followed, we find from the archæology of Europe that there were three countries, the inhabitants of which enjoyed a high civilisation—those of the Greeks, the Romans, and the Norsemen.

Now, let us transport ourselves to the North, and test the Roman and Greek writers by archæology, and see if they applied the name of Sueones and Saxons to all the tribes of Norsemen. Tacitus describes their ships, and his description corresponds exactly with the vessel found at Nydam, South Jutland, of which an illustration is given at page 220 of my first volume. There are great numbers of Roman coins distributed in finds and hoards throughout the ancient Norse or Viking lands, and numerous Roman and Greek objects, a number of which are illustrated in *The Viking Age*, distributed in the same manner as the coins.

In the archæological wealth of the North are many finds belonging to the earlier, but not the earliest, Iron Age. These are most interesting, because we see from them the wide range of the maritime expeditions and overland trading journeys of the people about the Christian era. They show the intercourse the people of the north had with those of the Black Sea and the Mediterranean, and also with the newly acquired provinces of the Roman Empire (Gaul, Britain, and Frisia).

The following examples will show how widely scattered are the Roman coins :—

In Sweden coins anterior to Augustus are found.

On the island of Gothland have been found coins from Augustus B.C. 29-A.D. 14 to Hadrianus A.D. 117-138 ; and to Alexander Severus A.D. 222-235.

On the island of Funen, from Tiberius A.D. 14-37 to Nerva A.D. 96-98 ; Trajanus A.D. 98-117 ; Lucius Verus A.D. 161-169.

On the island of Bornholm, Nero A.D. 54-68 to Hadrianus A.D. 117-138 ; and to Septimius Severus A.D. 193-211.

The present Peninsula of Jutland, Nero A.D. 54-68 to Trajanus A.D. 98-117 ; Trajanus to Macrimus A.D. 217-218.

In Holland and on the Cattegat, Trajanus A.D. 98-117 ; Septimius Severus A.D. 193-211 ; Elagabalus A.D. 218-222.

In Upland, near Upsala, Hadrianus.

Wester Gotland, Commodus A.D. 180-198.

Scania, Claudius A.D. 41-54 to Hadrianus A.D. 117-138 ; from Hadrianus to Alexander Severus A.D. 222-235.

In Oeland, Vespasianus A.D. 69-79 to Hadrianus ; from Hadrianus to Alexander Severus.

In Zealand.

Two of the largest hoards were : the one from Tindarfe in Gothland, which includes over 2000 Roman coins, forming an almost unbroken

series from the time of Nero (A.D. 54) to Septimius Severus (A.D. 211), and the other, from Hagerstaborg, in southern Sweden, from the same time. The Roman and Greek objects are distributed in the same manner as the coins, thus showing conclusively that all the Norse tribes carried on an extensive and continuous intercourse with the Roman world at the same period, and proving that it was these Norse tribes that the Romans called Sueones, Saxones, and Franci.

Let us bear in mind that we find from the days of the earliest Roman writers continuous traces of a maritime people in the north, whose country the Romans and their successors were never able to invade.

Judging from the extensive hoards of Roman coins discovered, it is not improbable that they were kept for some pressing occasion when they might be required, such as for purchases when sailing back to the Western or Eastern Empire. The island of Gothland is especially rich in Roman coins.

Nothing perhaps can give us a better idea of the refined taste of some of the Norsemen than the beautiful glass objects which have been found in different parts of the country. Many of these are evidently of Greek, some perhaps of Roman, origin. Exquisite bowls are found, which, after having been painted, seem to have been baked or subjected to heat in order that they might retain their colour. In the museums of Europe no such beautiful glass vessels have been found. Some of the tumblers have Greek inscriptions.

Their riding gear was of the most luxurious kind. From the Thorsbjerg finds we learn, from the Roman coins found there, how the people dressed in the second century of our era. Among the objects found are fragments of superb ring-armour: the men wore trousers and shirts, and belts. Their horses were richly harnessed.

Many of the forms of antiquities, such as neck-rings and gold snake-shaped bracelets, fibulæ, etc., which were thought to belong exclusively to the North, have been found in the graves of Kertch, Southern Russia, where they lay almost side by side with exquisite Greek antiquities.

Then, by the side of Roman coins and of Roman and Greek objects, in graves or elsewhere, are found numerous objects of Norse manufacture. To us this is a most important discovery, for we can, in many cases, affix a date to them with a fairly close approach to accuracy.

Now, let us deal with the most important part of our subject, that is, to find out from archæology who were the so-called Saxons of the Roman historians.

We are told in the records of the Romans that, during their occupation of Britain, the people they called Saxons had settled on the island. There are graves and objects in England that are neither Celtic, British, nor Roman. These are labelled by antiquarians under the various names of Saxon, Anglo-Saxon, and even Anglo-Roman. I maintain that these archæological remains form the strongest evidence as to who were the invaders and the settlers of Britain: and here a flood of light is poured in upon us, if we be willing to receive it with an open mind unhampered by traditions.

Every tumulus, grave, or object described by antiquaries as Anglo-

Saxon is the very counterpart of a Norse grave. The two modes of disposing of the dead practised in the Norse land at the same time —namely, burning and burying—existed contemporaneously in both countries. Some of my critics have asserted that there are no Viking relics that an experienced archæologist could not at once eliminate from the Saxon remains. What I want to know is, where to find the mother-country to which those Saxon remains point? We can at once eliminate English archæology or objects from those of the natives in the colonies of Britain, and trace the English objects to Britain. I myself have seen in the museums of Britain the same forms and objects which I have seen in the North, or in the following works:—*Nenia Britannica; Inventorium Sepulchrale;* Neville's *Saxon Obsequies*, etc. The similarity of objects is minute: the graves are alike, the contents the same, Roman objects and coins are there, filigree work of gold, objects of bronze covered with gold, bent and damaged weapons, remains of weighing scales, numerous kinds of beads, crystal balls, etc.

We find a Norse archæology in England anterior to the supposed landing of the mythical Hengist, "the stallion," and Horsa, "the mare" —of Vortigern and Port. What a name the latter is! Near Chatham, in Kent, in the southern counties, we see some of the earliest graves of the Norsemen in England. Many of their contents, such as the cruciform fibulæ, are found in Norway.

Some critics upon *The Viking Age* have pointed to a few scattered graves of a later period found on the coast of the ancient Friesland, the language of the inhabitants of which they call Low Dutch, to prove that the invaders of Britain came from there. If these people had been seafaring at an early period, Tacitus and the other Roman historians would, no doubt, have mentioned their warlike and maritime character; and we know also that these predatory seafaring hordes could not have come from the Rhine, for the Romans had possession of that country, and they themselves located the home of these swarms of Saxons so far from the coast where they held sway that they did not know where their country was situated. But, admitting that the Roman writers have omitted to mention them, the archæology of that period certainly points to a dense population like the one found in the North, and with similar objects belonging to the earlier Iron Age.

Can we suppose for a moment that it is only in the native country of a colonising power that these graves would be seen? In that case the inference would be that its people never had spread. Are not English graves scattered over many parts of the world and found in many places in large numbers? Is not Britain the great colonising power of the world of to-day, as the Norsemen were in the days of old? and, if its empire were to pass away, would not Britain indicate by its archæology and by its multitude of graves that it had been the seat of the British power, and that it was from it that its colonies sprang and not from some out-of-the-way place? Is the Cape of Good Hope colony, or some minor settlement, holding its sway over India?

The Viking graves found in other lands do not in the least prevent us from seeing where the seat and home of the Viking power was, for it is

in Scandinavia and in the Baltic countries that we have found a multitude of Norse graves, and a far richer archæology than, though similar to, that found in Britain. Wherever graves of the same type are found, we have the invariable testimony of the Roman and Greek historians, or of the Frankish and English chronicles, or of the Sagas, to show that the people of the North had been in that country at one time or another. Let us not forget that at the time of Charlemagne the Saxons were not a seafaring race. During his time the Sueones and Danes had the mastery of the sea. How could it be possible, if the Saxons had ever been a seafaring people, that they would, in a space of about three hundred years, have given up the seafaring life of their forefathers? The fact was that they had never been seafaring; there is nothing in their country found to show that they were. What, then, becomes of heredity?

One of the most important features in the life of the Viking Age was the ships in which the hardy Norsemen were able to rove over the seas of Europe. The ships were called by figurative and most poetical names. The general name for all ships was *skip*, but they were classified under different appellations. The war-ships were designated by several names, viz.: *Dreki*, *Dragon*, *Snekkja*, *Skuta*, *Buza*, and *Kaifi*; sometimes they were called long-ships.

From the *Ynglinga Saga* we gain an idea of the knowledge of geography in those times.

"The round of the world on which men dwell is much cut into by the sea: large seas stretch from the outer sea round the earth into the land. It is known that a sea runs from Njörvasund (Straits of Gibraltar), all the way up to Jórsalaland (the land of Jerusalem). From it a long bay runs north-east, called the Black Sea, which separates the three parts of the world; the east part is called Asia, but the one west of it is called Europa by some, and Enea by others. North of the Black Sea is the great and cold Sweden ('Svithjód.') Some say that Sweden is no smaller than the great Serkland (the land of the Saracens). Some say she is as large as Bláland, the land of the blue (black) men. The northern part of Sweden is uninhabited on account of frost and cold, as the southern part of Bláland is on account of the sun's burning heat. In Sweden there are many large herads (districts).

"There are also many kinds of people and many tongues. There are Asar, Dvergar, and Blámenn (black men), and many kinds of strange people. There are beasts and dragons, wonderfully large. From the north, in mountains which are beyond the settlements, a river springs that flows through Sweden; its right name is Tanais; it was in old times called Tana-kvisl,[1] or Vana-kvisl; it flows into the Black Sea. The land round Vana-kvisl was then called Vanaland or Vanaheim ('home or land of the Vanir'). This river separates the two-thirds of the world; east of it is Asia, and west of it is Europa."[2]

Further on the *Ynglinga* says:—"A large mountain-ridge runs from north-east to south-west; it separates Sweden the Great from other lands.

[1] Kvisl—a forked river, one of the forks where they unite: it means a branch of a tree.

[2] *Ynglinga:* Saga I.

South of the mountains, not far off, is Tyrkland. There Odin owned a great deal of land."

The energy of the Norsemen was for centuries unbounded. We find them gradually conquering the littoral lands westward of their own. We hear from Eginhard, and other Frankish records, that they considered Frisia their own. Their maritime expeditions or colonies extended to Britain, Ireland, the Orkneys, and the Faröe Islands, to Iceland, to Germany, Belgium, all over the present France, to Portugal and Spain, to Africa, to all the countries of the Mediterranean, to the Black Sea; their vessels ascended the large rivers of Russia; they sailed from the Gulf of Finland to the Black Sea, and even reached the Caspian. In their days Novgrad (Novgorod) was the seat of a great fair, and there they went with their ships. In a word, they went wherever their ships could find an entrance by sea: they conquered their foes and settled in the country. The blue eyes they have left behind them tell the tale. The broad Atlantic was not too wide for them—they sailed even across to Vinland, now called America. The finest colony they founded was Britain: there they transplanted their language, their customs, their laws, and their energy, which has not diminished: for their descendants are now, as they were then, the most daring, the most energetic of the people that go to far-off lands. In their country you find beautiful objects or coins of almost every land with which they made war or traded. I have given in *The Viking Age* the type of many of these, and I could have given a great many more.

## RECENT EXPLORATIONS IN PERU AND BOLIVIA.

*(With a Sketch Map.)*

By H. Guillaume, F.R.G.S.,

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The vast territories which now form the northern part of the State of Bolivia are still but imperfectly known, and many have not yet been visited by civilised men. The first recorded expedition to this country was undertaken by the Inca Yupanqui, for the purpose of conquering the Mojos, when he carried down the Madre de Dios in balsas 10,000 Indians, of whom scarcely 1000 reached the coveted land, the rest having succumbed to disease and wounds. Pedro de Candia was the next to invade the country, having received 300 men from Hernando Pizarro, who were decimated. The third adventurer, Don Diego Aleman, was taken prisoner by the Indians, and became their general. Later on, Juan Alvarez Maldonado, a native of Cuzco, set forth in quest of the fabled El Dorado with 100 horses and mules and 250 soldiers, all of whom save three were killed by the Chunches. The last military expedition, in 1873, was led by Col. D. B. Latorre, Prefect of Cuzco, who was killed by the Sirineyris Indians above the confluence of the Inambari with the Madre de Dios.

This region is clothed with exuberant vegetation, and is drained by many large rivers, all flowing to the mighty Amazon, but at present no

satisfactory channel has been opened by which its products may find an outlet to the Atlantic. It was proposed to form a continuous line of communication with the Amazon by constructing a railway to connect the river Mamoré with the Lower Madeira, the upper course of this latter river being obstructed by a long series of rapids and cataracts; but the scheme was abandoned in consequence of the enormous engineering difficulties to be contended with. Accordingly, Col. Antonio R. P. Labré, a Brazilian, and Padre Nicolas Armentia, a Bolivian, went forth in search of a more practicable route. Their investigations have added considerably to our knowledge of the interior of the vast continent of South America, and I propose in this paper to give a brief account of their expeditions, and the information they have collected.

It is interesting to note that Mr. Chandless visited this country in 1865, with the same objects as Col. Labré, but to the latter traveller was reserved the honour of being the first to cross the region lying between the Madre de Dios and the Purus. Col. Labré had already (between 1872 and 1885) made explorations on the river Ituxy, a tributary of the Purus, and had endeavoured to make his way overland to the Beni, but was stopped near the river Abuna by the density of the forests and the hostility of the Indians. He next resolved to take an overland journey from the Madre de Dios to the Acre or Aquiry, with which object he left San Antonio on the Madeira in May 1887, and, after a tedious journey up that river, reached Villa Bella at the confluence of the Beni. The expedition took no less than 34 days to cover this distance of 161 miles, for it had to pass nine formidable falls, where the canoes had to be unloaded and dragged overland on rollers; the porterage at the Ribeirão Falls alone, a distance of only three miles, delayed them for eight days. The cost of transit of goods, owing to these obstructions, is from 35s. 6d. to 52s. 4d. per arroba of 25 lbs. From Villa Bella, Col. Labré continued his journey along the Beni, past the Esperança Fall, to the mouth of the river Orton, where Dr. Vaca Diez has an india-rubber station. Thence he proceeded to Ribeira Alta, and, ascending the Madre de Dios, reached Maravilla, the trading station of Señores Marcaca and Marcier, on August 9th. Here he commenced his overland journey with Araunas Indians as guides, and after passing the Thana, a tributary of the Orton, and Capa, a village near the confluence of this river with the Manuripy, crossed the Abuna or Caramanu (Cara, Caoutchouc, and Manu, River) on the 24th. Six days later he had the satisfaction of reaching Flor do Ouro on the banks of the Acre or Aquiry, the settlement of Señor Manl. Joaquim, by whom he was warmly welcomed. The route between Maravilla and Flor do Ouro, followed by Col. Labré, is 115 miles in length, but by making a direct road the distance would be reduced to 92 miles. The construction of a railway would be attended by no difficulties. Col. Labré suggests that a short road, 37 miles long, should be made from Correnteza on the Beni to Guajara-mirim on the Guapore, to connect the navigable portions of these rivers and open up communication with the Matto Grosso. He also recommends that a road be constructed from Labrea on the Purus to Correnteza, with a branch to Hamayta or San Antonio. The left bank of the Madeira affords greater facilities for the construction of a railway than the right.

The former missionary journeys of Padre Armentia among the Araunas and Pacaguaras had led to such satisfactory results that the Bolivian Government commissioned him to make another expedition. Leaving La Paz on the 29th of May, he reached Tumupasa, on the Beni, on the 18th of the following month, where he waited until, on September 18th, he had collected a crew of eight men, with whom he started in a canoe from San Buenaventura. Though the canoe drew only three feet of water, it grounded several times, owing to the difficulty of finding the main channel of the river. The descent of the river as far as the mouth of the Madidi, where its volume and the speed of its current increase considerably, occupied thirteen and a half days, and from the Madidi to the Madre de Dios six days. Padre Armentia then commenced the ascent of the latter river, on October 16th, and followed it until November 14th, nearly to the thirteenth parallel of S. lat. He visited the Araunas Indians, and was well received by them. In 1883 there was no trade along the river, and the Indians were unprovided with hatchets, knives, and tools of modern design ; but now a brisk traffic in india-rubber has sprung up, and the Indians obtain these and other articles from the factories established along the banks.

The Padre now determined to make an overland journey, in spite of the great difficulty of transporting baggage, in which labour he counted on obtaining the services of the Huamapu, Mara, Buda, and Odarry Indians. He reached Cavinas by the Madre de Dios and Beni in eighteen days, arriving on May 2d. On June 12th he returned to the Madre de Dios with four youths, and, accompanied by Antonio Gil and Don Antenor Vasquez, who were desirous to ascertain whether the river which they had discovered the previous November was the Acre, they ascended the Madre de Dios for nine days to the Nuanua, where they left their boats and, after a tedious journey of fifteen hours, came to a river, which they were convinced was no other than the Orton. The distance in a straight line is probably only 27 to 30 miles. Returning to the Madre de Dios, Padre Armentia, still accompanied by Senores Gil and Vasquez, continued the ascent of the river until he entered the territory of the Araunas, where he intended to found a mission. Here he found the wretched survivors of five tribes, which had been almost exterminated by scarlatina. Three of them were attacked by a loathsome disease resembling elephantiasis. The Padre's companions were overcome by fatigue, and returned home ; but he himself remained until the following January, and would have endeavoured to reach the Acre, but the heavy rains and floods forced him to return to La Paz.

Below San Buenaventura the Beni runs through a plain about 790 feet above the level of the sea, which skirts the outlying hills of the sierra. The soil through which it flows being composed of alternate layers of sand and clay, frequent changes occur in the bed of the river, especially in its upper course above the mouth of the Madidi. Owing to the loose character of the soil the banks recede to a considerable distance—in some places to as much as 540 yards apart —whereby navigation is rendered difficult, particularly during the

dry season from August to November, when the deep channel is not easily recognisable. As the banks are also low, inundations are of common occurrence, so much so that the roads from Reyes to San Buenaventura and Port Salinas are often impassable the whole year through, being covered with water as high as a horse's chest; in the years 1885 and 1886 it rose as high as 6½ feet. Here and there in the river's bed lie banks which are never covered by water, and on which all kinds of animals take refuge. After receiving the waters of the Madre de Dios, the Beni becomes a majestic stream, and is navigable without interruption down to the Esperança Falls.

The Madre de Dios has its sources in the Peruvian province of Caravaya, and is formed by the union of the rivers Tono, Piñipiñi, Cosñipata, Pilcopata, Marcopata, etc. It is remarkable that for 280 miles above its confluence with the Beni it receives no important tributary. Only one small stream enters it on the right bank, the Manuripy, which flows from the neighbourhood of the Madidi, and is only 55 yards wide at the mouth. Padre Armentia believes that the Madre de Dios has a navigable course of 400 miles. While the Beni has a fall of 9840 feet in a course of 850 miles from La Paz to the Mamoré, where its height above the sea does not exceed 490 feet, the Madre de Dios has a fall as great, or perhaps greater, during a course of not more than 500 miles. As the fall in the 300 miles above its junction with the Beni does not exceed 260 feet, the greatest change of level must take place in the upper course of 200 miles, where numerous banks of shingle render navigation difficult, and the waters rise over 30 feet in time of flood. The tributaries, the Genechiquia and Nuanua, are insignificant streams, only sixteen yards across and much encumbered with fallen trunks.

Between Port Maru and Chumu, on the Madre de Dios and the river Manurini, an affluent of the Orton, lies high land five to six leagues in extent and watered by clear-running streams. Between the Genechiquia and the Orton the land lies low for the first two leagues and is subject to inundations, but for the remaining seven or eight leagues it is more elevated.

The Orton, called also the Tahuamanu and Datimanu, or Turtle River, has not yet been explored to its source, which probably lies between 11° and 12° 30′ S. lat. and at about 70° 10′ W. long. It runs in an exceedingly tortuous course parallel to the Madre de Dios at a distance of twenty to twenty-eight miles, and discharges itself into the Beni below the mouth of the Madre de Dios, in 10° 48′ S. lat. The surrounding country as far as fifteen days' journey from its mouth lies very low, and is therefore subject to floods. Its course, much obstructed by fallen trees, extends for a distance of about 385 miles. Its bed is narrow at the mouth, but widens out above to a breadth of from 65 to 130 yards. Not far from the mouth a bank extends across the river which, in the dry season, leaves a passage barely sufficient for canoes of small draught. The Manurini, one of the tributaries of the Orton, abounds in fish, and in August 1885 Padre Armentia's party caught one 1½ yards long, the head of which was armed with a spear ten to twelve inches long and one inch thick at the base. This is the river which Señores

Gil and Vasquez supposed to be the Acre. At S. lat. 11° 36′ they found the river 110 yards wide and 40 feet deep, and discovered two affluents on the northern bank. Its banks are clothed with extensive forests of india-rubber.

The Abuna, called by the natives Uaicomanu, discharges itself into the Madeira near the Araras Falls. It receives on its right bank the Tsipamanu or river of the Marayahu palm, a tree which grows there in great quantities. The Abuna contains a larger volume of water than the Orton. Falls impede its course near the mouth. Its banks are clothed with india-rubber trees.

The Pacaguaras, named also the Chacobos, were formerly much more numerous. They dwell between the Beni and the Madre de Dios, keeping at a distance of three leagues from the latter river, for the low ground on its banks is rendered uninhabitable by insects. There are also one or two tribes of these Indians on the Genesuaya and Ivon, tributaries of the Beni, and three families dwell on the Orton. Considerable numbers also people both banks of the Madeira, Mamoré, and Abuna, and probably the Hypurinas on the Acre and the Purus belong to the same race. The men dress in long purple robes, but the women go about naked. The lower lip and nose are pierced, and in the holes are placed sticks as thick as a penholder, ornamented at both ends with feathers. They hunt during the greater part of the year, but they also cultivate maize, plantains, yucca, pepper, and various kinds of sugar-cane. They carefully conceal from strangers their idols and religious rites, but it is known that they believe in a god called Papaguara, whom they represent by a tiger's head, a pig, or some other animal.

The Araunas and the Cavinas have the same dialect, religion, and customs. The principal group is now settled on the Orton, but they also dwell on the Abuna, and on both banks of the Madre de Dios above the mouth of the Genechiquia, which marks the boundary between them and the Pacaguaras. The Araunas bury their dead in their huts. They do not use canoes, but cross the rivers on rafts of bamboo. The epidemic of scarlatina already referred to carried off about one-third of this people, so that a large number of villages are deserted.

The Toromonas occupy the country between the Madre de Dios and the Madidi, extending from 12° to 13° S. lat. According to the Araunas, some of their tribes are fond of war and others peaceful. It is now believed that it was this people and not the Guarayos who attacked Isiamas and Cavinas in 1884. Their territory may be reached either by ascending the Madre de Dios for 240 miles, or by taking a north-westerly direction from Cavinas across the country.

The Guarayos dwell on the slopes of the mountains round the headwaters of the Madre de Dios and the Madidi, and on the adjacent plain. They are a terror to the Isiameños and Cavineños: indeed the Araunas use the word Guarayo as equivalent to "enemy," and also as a verb meaning "to kill." Little is known about this fierce people. They make canoes, 33 to 50 feet long and 15 to 28 inches wide, by burning out tree trunks to make them hollow. Their knives are made of the hard

*chonta* wood (*Bactris ciliata*). They wear long cloaks, called *masamahi*, on festive occasions; at other times they go about naked. Most of the work falls on the women. The Guarayos believe in a god named Baba-Buada, who they say is identical with the wind (Utana), and resides in the air towards the south. He is the creator of all things, and causes the earth to yield its produce, and therefore they hold feasts in his honour, one before seed-time and the other before harvest, at which they dance and sing day and night and drink unfermented *chicha*, a beverage made from the juice of the manioc reserved for those occasions. Drunkenness is unknown among them. Besides Baba-Buada the Guarayos recognise a number of inferior gods: Juti, Mara-Edutzi, gods of time, etc.

Among the trees may be mentioned the cedar, the *Palo Maria* (*Callophilum Braziliense*), the wood of which contains a large proportion of resin, and is used to make canoes; the *tajibo* and *iape*, tall trees used in building; the *acuayaco*, or *paquio*, and the *estoraque*, large resinous trees, the hard wood of which is used in sugar-mills, and a species of walnut, the bark of which yields a staining fluid. Of palms there is a great variety, of which the *asahi* (*Euterpe edulis*) bears a fruit tasting like a chestnut. The *patawa*, *sayal*, or *majo* (*Œnocarpus Batava*), bears a fruit which contains a large quantity of excellent oil, and, eaten with sugar, is agreeable and nutritious. The fruit of the *matacu* and the *cusi* (*Attalea Humboldtiana* and *A. spectabilis*) is very oily, and is made use of by the Indians as a pomade. When dried, it is employed to coagulate india-rubber. Hats are made from the *jipijapa*, called also *bombonaje* (*Carludovica palmata*), and buttons from the ivory palm (*Phytelephas macrocarpa* and *P. microcarpa*). Sarsaparilla, ginger, coca, and vanilla grow also in this region. The *suyuyo* bears a soapy fruit used by the Indians for washing their hair. The *isiga* yields an aromatic resin, and the *quinquino* the balsam of Peru. The tamarind and various kinds of red pepper (*Capsicum annuum*, *frutescens* and *baccatum*), the *copaiva*, the *ceiba*, and other cotton-bearing trees, and the *caré* (a supposed antidote to serpents' bites) grow here. The root of the *yuquilla* mixed with human milk is applied to sore eyes, and the trunk of the *platanillo*, a variety of plantain, yields, when tapped, about a pint and a half of secreted rain-water. A poison is extracted from the root of the *siliman* to stupefy fish, and the *patillo* yields a saffron-coloured dye. The fruits and vegetables comprise bananas, pine-apples, chirimoyas (*Annona cherimolia*), sugar-cane, potatoes, tomatoes, etc.

The principal animals are the tapir, deer, the peccary, the black bear or bee-eater, the spotted cavy, which is very good eating, monkeys, etc. Parrots and birds of gay plumage abound, and also many varieties of partridge. About the waters flock *batos* and other kinds of geese, and kingfishers. The *tapacare*, a large bird armed with a spur on the wing-joint, haunts the lakes. The *lekeleke* also has a similar weapon. There is a large variety of herons and of birds of prey.

The *toro* is a large fish with a grey back striped with white, and attains a length of 9 feet and a weight of 345 lbs. The *suche* is similar

in appearance, but has a larger head: it weighs about 100 lbs., and has a rich flavour. Eels and turtles are plentiful.

India-rubber is at present the chief commercial product of the Madre de Dios and the neighbouring rivers. This industry was commenced on the Madre de Dios in 1883, and on the Orton in 1885. Three thousand people are now engaged in collecting the sap and preparing it for exportation. A puncture is made in the trunk of the tree to a depth of one inch, and the sap is allowed to flow into a cup holding one-eighth to one-fourth of a litre. It is then coagulated by pouring it into shallow moulds, and smoking it with the oil of the nut mentioned above. Some trees yield twenty-four gallons a year, others only five—generally more the second year than the first. The collection has to be suspended from August to January, as the sap is not in proper condition during rainy weather.

The following meteorological observations were made by Padre Armentia on the Beni, Madre de Dios, Orton, and their tributaries, during the year 1885 :—

| 1885. | Thermometer Mean. | Barometer Mean. | Wet and Stormy Days. |
|---|---|---|---|
| January, | 80·2 | 29·25 | 10 |
| February. | 80·1 | 29·27 | 15 |
| March, | 78·6 | 29·31 | 19 |
| April, | 78·8 | 29·33 | 7 |
| May, | 75·0 | 29·29 | 7 |
| June, | 70·9 | 29·37 | 1 |
| July, | 74·5 | 29·30 | 1 |
| August, | 75·4 | 29·27 | 2 |
| September, | 79·2 | 29·28 | 7 |
| October, | 80·2 | 29·27 | 16 |
| November, | 80·2 | 29·32 | 16 |
| December, | 81·0 | 29·40 | 22 |

The storms come chiefly from the south-west. Padre Armentia also determined the latitude of certain points :—

| | S. Lat. | | S. Lat. |
|---|---|---|---|
| Mouth of the Madre de Dios, | 10° 80′ | Mouth of the Orton, | 10° 45′ |
| ,, ,, Genechiquia, | 11° 22′ | ,, ,, Genesuaya. | 11° 23′ |
| ,, ,, Nuanua, | 11° 32′ | ,, ,, Jenejoya, | 11° 44′ |
| ,, ,, Manuripi, | 11° 45′ | ,, ,, Madidi, | 12° 33′ |
| The Vasquez Rapids, | 12° 35′ | Isiamas, | 13° 32′ |
| La Cruz, | 12° 56′ | Port Salinas de Reyes, | 14° 17′ |
| Carmen de Tahuamanu, | 11° 36′ | San Buenventura, | 14° 26′ |

I will conclude this part of my paper in the words of the Padre. "All these rivers are navigable, but are cut off from the Atlantic by the falls of the Madeira. I look forward, however, to the day when, after roads have been made, these streams will become the busy highways of this region. What riches lie neglected on their banks! Valuable woods,

medicinal plants, aromatic barks and resins, textile plants—in a word, the most luxuriant, the most varied, and perhaps the richest vegetation on the globe. Here are vast tracts of land where all the necessaries of life are found in abundance."

Another part of Peru which would derive incalculable benefit from the roads proposed by Colonel Labré are the gold districts of Caravaya and Sandia. Cut off entirely from the remainder of the Puna department by snow-capped cordilleras, they have been little heard of since 1869, when Clements Markham visited them to collect specimens of the cinchona-tree. The first Spanish adventurers were stimulated by their thirst for gold to surmount the barriers which nature seemed to have interposed, and soon after the conquest some of Pizarro's followers opened a rich mine, which they called San Juan del Oro, and founded a town. In 1808 the Indians rebelled and massacred the Spaniards, and since then the mines have been worked in a very primitive fashion by Indians, who extract about 3250 oz. Av. annually. The mining industry is, however, capable of great development. Messrs. Rosell and Simpson, who surveyed these provinces, stated in a report published at Lima a short time ago that gold exists in these districts to an almost unlimited amount. Mr. Rosell found in picked samples of ore 106 oz., 347 oz., 662 oz., and in one taken at Ananea no less than 2576 oz., of gold per ton. These engineers estimate the quantity of auriferous earth in the district of Sandia alone at 14,415 millions of cubic yards, and the value of the gold it contains at £300,000,000 sterling. The mines are difficult of access, being situated on steep hills, and they are approached by foot-paths only, so that everything must be carried from or to them on men's backs. Considerable deposits of coal, copper, lead, marble, and jasper also exist in these districts. Sandia has an area of 4254 square miles, and a population of only 12,721. Caravaya is also very sparsely populated by some 8000 persons.

I must now refer to the travels of Señor Carlos Fry of Cuzco on the Ucayali and its tributary, the Urubamba. The latter river rises near Lake Titicaca and flows past Cuzco, the ancient capital of Peru, and the ruins of many other native cities. The terraces constructed on the slopes of its valley for the purposes of cultivation, the immense irrigation works, and the utilisation of the smallest strips of ground testify to the existence in former times of a dense and civilised population. Señor Fry's journey was undertaken for the purpose of selecting suitable landing-places on the navigable parts of the river, at which, by means of roads, the produce of the country might be collected for transport along the Amazon, and also to discover what districts were best adapted for colonisation. He left Rosalina in a canoe accompanied by three friends, and on October 30th reached Tonquini, where the river passes through a fissure in the hills resembling a gigantic portal. Here the rapids which impede the navigation of the upper course come to an end, and the lower Urubamba is navigable by steamers. The rapids render the journey down to Tonquini very dangerous. At the last of them Señor Fry's canoe was swamped, and he lost his instruments and clothes, so that he was obliged to adopt the Indian dress. The travellers passed the mouth of the

Lavero River, which descends from the gold district of Paucartambo, and a long range of hills containing coal. The journey to Tonquini occupied three days, the distance, owing to the windings of the river, being 120 miles, but from Rosalina to Tonquini as the crow flies is only 60 miles. On November 8th they left Tonquini, and on the 12th arrived at Providencia, which is situated at the point where the Tambo mingles its waters with those of the Urubamba to form the Ucayali. The country passed through during this journey of 260 miles was beautiful and luxuriant, with lofty hills and sparkling streams. Fish and game were abundant, and the climate was delightful. M. C. Wiener also styles it "one of the most beautiful regions of the world." The next noteworthy point was Unini, an important trading station from which Indian paths lead into the interior. It would be advisable to make roads on the same course so as to reach the capital with as few detours as possible. On the 14th they reached Pachitea, now a very important place containing many large commercial houses, to which large steamers run regularly, though seven or eight years ago hardly a hut was to be seen there. It was here, in 1866, that Lieutenants Tavara and West, of the Peruvian navy, were massacred and eaten by the Cachibos, but now these Indians have been civilised by trade and are as friendly as any other tribe. The remainder of the journey down the Ucayali was performed by steamer. Having passed the Pampas del Sacramento, an immense plain extending over 180,000 square miles and covered with primeval forest, the party arrived at Iquitos on January 20th. This town, the principal Peruvian port on the Amazon, which is here 35 fathoms deep, now contains over 8000 inhabitants, of whom five-sixths are half-castes and civilised Indians, and the remainder South Americans and Europeans, with a fair number of Chinese. There are several commercial houses, each running one or two steamers under the Brazilian flag. The value of the imports and exports amounts to 2,000,000 dollars. The chief article of export is india rubber. The distance travelled by Señor Fry from Cuzco to Iquitos was about 1710 miles; 130 miles along bridle-paths, 610 in canoes, and 970 by steamer.

The first natives that Señor Fry met with were Campas, who are also called Thampas, Choseosos, Machigangas, and Antis. This race is high-principled and intelligent, and retains the mild and generous disposition of the ancient Peruvians. They dwell on the banks of the Urubamba, Apurimac, Ene, Tambo, in the great chain of the Pichis, and around the rivers which unite to form the Pachitea. The Campas living on the banks of the larger rivers are very friendly to the whites, and have been much changed by the civilising influence of trade, but those in remote places lead a very primitive life, subsisting on wild fruits, and look upon the accounts that reach them about white men as myths.

The Piros are a wandering tribe, occupying the basins of the Lower Urubamba and Upper Ucayali for a distance of 320 miles. They speak of tribes of their race living on a river to the east, with whom they communicate by means of the Camisia and other rivers: this must be the Purus. These Indians are tolerably civilised, are of an inquiring mind, and are

friendly to Europeans: many of them know Quechua and Spanish, and some speak Portuguese. They are skilful in weaving and house-building, and make good weapons and domestic utensils. As canoe-men, they are unrivalled; they often make voyages of 50 to 200 leagues merely for the sake of amusement. They imitate the whites in their manner of receiving visitors. At meals the men eat together, and are waited on by the women, who afterwards take their food apart. Polygamy is practised.

The small tribe of the Amahuacas or Ipitineres live on the right bank of the Ucayali, and some are to be found also on the Urubamba. They are at present in a savage state, wearing no clothes and dwelling on the branches of trees, but they appear eager to obtain articles of European manufacture. The india-rubber collectors who ascend the affluents of Ucayali have established friendly relations with these Indians, have instructed them in the method of collecting the caoutchouc, and given them the necessary implements.

The Conibos and Sipibos are very similar. Like the Piros, they are river Indians, and dwell on the banks of the Ucayali. They wear European clothing, use guns and foreign tools, drink imported liquors, speak a little Portuguese, and travel by steamer. They cannot therefore be called savages, but they still retain two barbarous customs: compressing the head of a new-born child with pieces of wood so as to give it a conical shape, and interring alive crying and fretful infants. Some writers attribute to this practice the rapid diminution in the numbers of this tribe, which is fast approaching extinction. They have arrows, javelins, etc., but their favourite weapon is the blow-pipe, which they use with admirable skill. Their principal raids are made against the Amahuacas, to kidnap their boys. They claim for their race an antiquity going back to the time when the sun and moon were "children." Señor Fry recognises a great similarity in their language and mode of singing to the Chinese: like that people, also, the Indians wear pigtails. The language of the Conibos is difficult, particularly in the pronunciation. They use the same word to denote several different objects, and, on the other hand, have several ways of expressing the same idea. They are friendly and hospitable to the whites, and have never, like many other tribes, murdered any Europeans. They are simple and frank in their manners. When a Conibo visits a white man, he examines his clothes, pockets, and other belongings, and sits down at the table without waiting for an invitation. They are also very straightforward in speech, not hesitating to tell any one that he disgusts them or that he lies. They are good canoe-men, and weave hats similar to the Chinese hats from coarse strips of a kind of palm. The Conibos cannot count beyond five, the Campas beyond three, or the Piros beyond ten.

The marvellous fertility of this virgin soil produces crops with a minimum of labour, and is a guarantee for the future prosperity of the country. Rice yields two crops annually, the sugar-cane ripens every eight or nine months without being replanted, tobacco yields three crops of fine quality, and plantains, pine-apples, vanilla, and

yucca ripen at every season. Cotton, of a size unknown elsewhere, grows wild in great quantities; coffee and coco produce two excellent crops, and maize may be cut every three months. The most valuable product is india-rubber (*Ficus elastica* and *Siphonia elastica*), which grows in wide-spreading groves, and may be called the vegetable gold of this region. Cinnamon, camphor, balsams, chonta-wood, and many trees suitable for use in various branches of industry, are to be found here: also the ivory palm, the *bamboneje*, the *copaiva*, the bamboo, and other canes. The *huitoc* fruit (*Genipa oblongifolia*) contains more than 50 per cent. of tannic acid, and is used by the Indians for dyeing their bodies: it may prove useful for tanning. Indigo is also a native of this country. There is a large variety of medicinal plants. The cinchona-trees grow up on the slopes of the mountains, away from the rivers, so that the bark is not collected. The coca plant (*Erythroxylon coca*) yields a crop every two months. To these may be added the tamarind, *matico* (*Artanthe elongata*), *huaco* (*Mikania guaco*), *barbasco*, or bracelet-wood (*Jaquinia armillaris*), used to stupefy fish, sarsaparilla, and ipecacuanha. Among other fruits are the plantain (*Musa paradisiaca*), pine-apples, cashew-nut, (*Anacardium occidentale*), grapes, the *palta*, or alligator pear (*Persea gratissima*), oranges, citrons, lemons, etc. The chief vegetables and spices are potatoes, pepper, beans, arnotto, the papaw, and ground-nuts.

This country contains the animals found generally in South America, such as wild hogs, bears, the puma and other varieties of the feline species. In the rivers the manatee, or sea-cow, is caught, which yields eight to ten arrobas of oil used in making soap. The turtles weigh four to five arrobas: they deposit their eggs during the months of August, September, and October. The land-tortoise weighs about one arroba: its flesh is excellent. The *yacu mama* is a kind of boa. The fishes are innumerable.

Señor Fry proposes that three railways should be made to develop the resources of this country: namely, one from Mayniqui to Rosalina, and thence to Cuzco (195 miles), another from Acon, on the Ene, to Huanta and Ayacucho (90 miles), and a third from Unini to Tarma and on to Lima. There are no serious engineering difficulties to be overcome in the construction of these railways. At present goods have to be conveyed to the west coast on the backs of mules and men at the enormous cost of £40 to £80 a ton, according to the season and the nature of the goods. Only the most valuable, therefore, can be exported. Sometimes also a load is lost irretrievably by a mule falling into a ravine. Were these railways made, a new era of prosperity would commence for this country. Besides the vegetable treasures already referred to, the plateau of the eastern cordilleras would furnish alpaca, vicuña, and other wools, gold, silver, copper, diamonds, emeralds, and other precious stones.

The triangle formed by the Tambo and the Urubamba, which contains an area of over 20,000 square miles, is admirably adapted for colonisation. It is intersected by numerous rivers, of which many are navigable and afford means of direct communication with the Atlantic by the Ucayali and Amazon, and, on the completion of the railways, will be within easy reach of Cuzco and of the Pacific coast.

In conclusion, I may state that the Peruvian Government, aiming

solely at the development of the resources of their productive country, throws it open to the whole civilised world. I trust the day is not far distant when the self-sacrificing efforts of those intrepid pioneers of progress, Raimondi Labré, Fry, and others, will succeed in attracting to those lands, now sparsely populated by semi-civilised Indians, British labour and capital. The ever-increasing population of the British Isles renders it necessary to neglect no outlet which appears at all favourable, and I feel sure that, were the advantages which Peru offers fully known to the British people, they would eagerly avail themselves of them.

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## SIR W. MACGREGOR'S DISCOVERIES IN NEW GUINEA.

Sir W. Macgregor, having most successfully carried out the ascent of the principal summits of the Owen Stanley Range and the exploration of the surrounding country, has given a detailed account of the expedition in the *Annual Report on British New Guinea*, Sept. 4th 1888 to June 30th 1889. He heard that a river named the Vanapa (marked *Edith* R. in Mr. H. O. Forbes's map, *Scot. Geog. Mag.*, vol. iv. p. 414) entered the inlet known as Galley Reach, in Redscar Bay, and that probably it would be found to run down from the great mountain ranges of the interior. Accordingly, having at the time (April 1889) no vessel at his disposal but a whale-boat, and being, therefore, precluded from undertaking long sea excursions, he determined to devote some time to the ascent of this river.

"With this object in view," he writes, "I left Port Moresby on the 20th April in my boat manned with a native crew, accompanied by my staff, and proceeded along the coast to Manu-Manu [an island in Galley Reach], which was reached the following day. On the 22d we entered one of the mouths of the Vanapa River, which opens into Galley Reach on its eastern side, about five miles from Manu-Manu. This entrance to the river lies in a bend of the inlet where the coast is covered by mangrove swamps, and escapes observation unless one is searching expressly for it, which no doubt explains its being omitted altogether on many charts of this part of the country. We got some seven or eight miles up the river the first day, having the tidal water for about three or four miles; but beyond that point, in consequence of recent heavy thunderstorms inland, the river was swollen and muddy and the current against us strong. As far as the tide ascends the river mangrove swamps grow on the banks, and the *Nipa* palm in the river's edges; but beyond that the banks become ten or twelve feet high, and are clothed with *Ilimo* and other large trees, the soil being deep and rich, but whether liable to occasional flooding cannot at present be stated. On the 23d we continued our course up the river for about seven miles. During the afternoon we began to approach the first low hills in this river's course, and had to ascend two rapids, the first we had met. Below the rapids the river bottom contained many 'snags,' but not enough to impede the passage of the boat or even to make it dangerous going up against

stream, but requiring very careful watching coming down the river. The course of the river we found to be very crooked, at times running north, at times due south. No natives, and hardly any trace of natives, were seen during these two first days of our journey. The nature of the country was much the same as that traversed the day before, there being a large amount of deep, flat, alluvial land on both sides of the river, of which, however, probably a large amount is wet and liable to be flooded periodically."

After this the ascent grew more and more difficult day by day, owing to boulders sunk in the river and to rapids, which at last became so numerous that, on April 27th, it was found impossible to proceed any further by water. A camp was formed, to serve as the principal depôt for the expedition, on a spot estimated to be about forty miles along the river from Manu-Manu. Its latitude, observed by Mr. Cameron, Sir W. Macgregor's private secretary, is 9° 7′ S. Being now convinced that it would be possible to lead a sufficiently numerous expedition from the Vanapa into the interior, Sir W. Macgregor sent Mr. Cameron back to Port Moresby for the necessary provisions and carriers, while he spent the interval in reconnoitring the country in the immediate neighbourhood with a view to ascertaining the best route for the expedition to take.

On May 12th, Mr. Cameron returned to the camp with fifteen men carrying supplies. The river being flooded, he had left the main body of the expedition to follow in two whale-boats, and hurried on overland lest the party at the camp should run short of provisions. The extremely rugged nature of the hills had rendered his march very laborious. Near a place where a cleverly contrived bridge of rattans spanned the river, he met with some of the natives, who were at first shy, but after a little time became friendly and offered him food.

The whale-boats arrived on the 16th, and the next morning the expedition, consisting of forty-two persons, among whom were four Europeans, marched out of camp. "As the path had been cut for the first day's march, we covered about four miles before we camped in the afternoon at Exton Junction, where the Exton Creek enters the Vanapa River. We traversed the long spur of Mount Gleeson, its highest point being 1292 feet, and had to cross another ridge about 800 feet high, while the altitude of our camp at Exton Junction was only about 300 feet. Some of our carriers had to do a double trip, as there were some three or four packs we could not bring with us from camp. For this they were promised a moderate addition to their pay, three sticks of trade tobacco each.

"We left Exton Junction early on the morning of the 18th, and had at the start some very steep ridges to cross, which did not, however, take us before lunch over any ground exceeding 700 or 800 feet in height. We passed several creeks in slate and quartz formation, which looked, especially one, very promising for gold, but no trace of that metal was found on washing gravel. At noon we halted at Taula Creek, at an altitude of 583 feet, for lunch, having walked over rough road, about two miles from Exton Junction. The same formation of slate and quartz was observable here, but the hill-sides were very precipitous and the

timber not as a rule large. We then ascended the steep western end of Guba Hill, which we crossed at about 1000 feet, and towards 3 P.M. camped on a spur, about half a mile from its summit, having walked about three miles. The weather remained fine, and the health of the party was good. There were many traces of the passage of natives along the ridges, where they had 'blazed' trees and broken branches; but none were seen or heard."

"As a native cannot carry more than about three weeks' food for himself, say for fifteen days of forward march and six days' returning, it was necessary to detach a number of men from our party to fetch up supplementary supplies, as otherwise we should soon come to the end of our stock. Accordingly Peter Lifu was despatched from the top of Cæsar Hill with eight Kapakapa men, who proceeded on the morning of the 19th to Manu-Manu by boat, in order to bring up the river to our depôt there all stores left at the coast." The same day Sir W. Macgregor marched 2½ miles, crossing, at the height of 500 feet, a fine clear stream about twenty yards broad, which he named the Atoa, and encamped on a ridge 1500 feet high. The next night was passed on the north side of Mount Kowald, 500 feet below the summit. The temperature at this altitude, 2750 feet, did not fall below 75° Fahr. Mount Kowald is of the same slaty formation observed along the whole route. It contains a large quantity of fine straight timber, but not many lofty trees. It should be noted that two or three snakes were killed on this mountain, for none was seen further inland. The next day the party descended to the Vanapa, which at that point had an altitude of 800 feet. Here a raft was built and the baggage carried over to the opposite bank. Finding it impossible to follow the river owing to the ridges that abut in steep precipices on its bed, "we therefore cut our path along the crest of Mount Belford, and camped in the afternoon at an altitude of 2530 feet. Mount Belford does not differ in formation from Mount Kowald and the other hills already noticed. It is exclusively of a slaty nature, with thin quartz veins interspersed. It is not a rugged mountain, speaking comparatively; it contains a large quantity of fine trees, and is more frequented by birds than any mountains crossed by us, unless perhaps Mount Kowald. It appears from the presence of native paths and camp sites to be a favourite hunting-ground; but no natives reside on it or plant on it. We had some light showers of rain here, but no thunderstorm."

"As it appeared desirable to get further east before approaching the main range, it was deemed well to follow further along the crest of Mount Belford, whence it was hoped a spur might be found on its northern side that would lead us to Mount Musgrave, and our march was therefore continued along the top of Mount Belford during the whole of the 24th. By about 3 P.M. we had come about three miles, and I began to think it unadvisable to proceed further in that direction. Unfortunately we were completely enveloped in mist, and could not see the next range. We camped at a small hunting-house at an altitude of 3500 feet. The thermometer stood at 74 degrees Fahr., at 3 P.M.; but towards morning we felt it for the first time on this expedition decidedly cold, although the

thermometer did not show less than 65 degrees Fahr. The weather was wet, but the rain that fell was not heavy." On the northern slopes of Mount Belford grow large quantities of fine timber, and many other botanical objects attracted the attention of the party—tall and graceful wild bananas, a pepper very similar to the kind used in making the national beverage of the Pacific, and a remarkably fine rhododendron. Having crossed, at a height of 2635 feet, the Joseph River, a fine mountain stream twenty yards broad which runs along the foot of Mount Musgrave, the party ascended a spur of this mountain, and at last reached an elevation of 5588 feet. Not far from this camp Sir W. Macgregor and Mr. Cameron obtained a good view of the Owen Stanley Range. On their return they found some natives in the camp, with whom they were on the most friendly terms as long as they remained in the vicinity. These natives "speak a language that has strong affinities with that of the Koiari people on the one hand and with that of the people between them and 'Doura' on the other: that is, a Papuan dialect. They are physically stronger than the coast men, perhaps a little shorter, having long and strong bodies, but generally shorter and more muscular legs. They do not tattoo, nor wear nose nor ear ornaments. The older men wear caps made of the best of cuscus fur, with a frontal ornament made of white shells ground down to thin plates and then sewed together, and with cheek pieces of black cassowary feathers. Others wear caps that are more elaborate, but less picturesque, trimmed with boars' tusks and the teeth of dogs. Youths generally wear on their heads a piece of native-made cloth, apparently manufactured from the paper mulberry, into which they gather their copious mops of hair. On the breast they wear a piece of net-work, with a small mesh, about 8 or 10 inches deep, and long enough to extend rather more than half-way round the ribs. It is fastened behind by strings from its four corners. They all wear the perineal band, as worn at the eastern end of the Possession; but in addition to that every man and boy is clothed in a girdle of paper mulberry cloth about 10 or 12 inches deep, but cut up into lappets, and over this they wear in front as an apron a small net bag, about 9 inches or a foot in length. On the neck, legs, and arms they wear rings of cane, sometimes plain, sometimes plaited or twisted. Their features are decidedly good, their faces indicating more character and strength than those of the average coast men. In not a few the cheekbones are rather broad and prominent. The nose is generally of the Semitic type, the nostrils either not arched or much less so than is usual in Papuans, and the chin and underjaw are also stronger. They possess all the volubility of the Papuan race, are less shy than tribes that have seen more of white men, but are apparently superstitious and easily frightened."

The party advanced along the crest of Mount Musgrave till they reached a height of more than 8000 feet, always hoping to find a spur running towards Mount Victoria. But no such spur could be seen, and therefore they were compelled to descend towards the Vanapa River. Mr. Cameron, not feeling well, remained on Mount Musgrave, and, during Sir W. Macgregor's absence, ascended the highest point of Mount Musgrave, which he found to be 9150 feet, but he did not cross the ravines

to the more lofty and precipitous Mount McIlwraith. Sir William's party, now reduced to ten, crossed the Vanapa with considerable difficulty, owing to the quantity of water and the rapidity of the current, at a point 2790 feet above the sea-level, the temperature at the time, mid-day, being 68° Fahr. They had then reached the foot of Mount Knutsford, the first elevation directly connected with the Owen Stanley Range. Up this they toiled laboriously, cutting their way through the forest dripping from the fog which enveloped the mountain up to about 9000 feet. Here commences an undergrowth of bamboo which, 500 feet higher up, grows as thick as a field of wheat, and attains such a height that it entirely covers trees of large size. The summit, 11,100 feet high, was reached on June 6th; it consists of two masses of rock, each 100 feet high, standing about a quarter of a mile apart. Only within 500 feet of the summit were Alpine flowers observed: below, little grows but bamboo, moss, and trees. Sir W. Macgregor describes the view from the summit in the following words:—"Here we were in the afternoon clear above the great masses of snow-white cumulose clouds which lay below us some two or three thousand feet and completely cut off all view of the hills and valleys beneath. The upper surface of this vast ocean-like cloudy expanse was almost dazzling in its whiteness, extending its rugged masses, more uneven than the jagged peaks of any mountain land, so far that nothing could be seen beyond their horizon. These great cumuli lay apparently perfectly still, like an arctic world of frozen snow; but every now and then small jets of mist shot with arrow speed up narrow ravines right to the summit of the mountain as if projected upwards by the weight of the superincumbent cloudy matter forming the upper layer of the stratum. These clouds are formed locally, and are not brought up by the south-east wind, from the force of which they are protected by the Owen Stanley Range. The stratum is usually about 4000 to 5000 feet thick. The tops of the higher mountains on the south and south-east—Mount Service, Mount Morehead, and Mount McIlwraith—projected above this stormy-like sea of cloud clear, bold, and dry, at least 2000 feet; Mount Victoria towered 4000 or 5000 feet clear over it, and on the west and north Mount Griffith, Mount Douglas, and other striking heights, which will be mentioned later on, reared their lofty crests several thousand feet above mist and damp into one of the finest climates on the globe." From the top of Mount Knutsford the course of the Vanapa could be distinctly marked. At the north-west end of Mount Musgrave it divides into two great branches, of which the eastern is, perhaps, slightly larger than the other; it separates Mount Knutsford on the north from Mounts Musgrave and McIlwraith on the south up to where it meets a spur of Mount Victoria, after which it separates into five streams. The whole southern slope of the Owen Stanley Range is drained exclusively by this river, for the Brown River lies beyond mountains 10,000 to 11,000 feet high. The Brown is said to be a branch of the Laroki, and to be much larger than the Vanapa. From the western end of Mount Musgrave to the sea, the Vanapa is well suited for the transport of timber, but above that point it is too much obstructed by immense boulders.

To the north of Mount Victoria rises Mount Douglas, which is

separated from Winter Height on the north-west by Dickson Pass. Between this pass and Mount Knutsford, Sir William Macgregor's party, now reduced to five men, crossed the Vanapa for the last time. Even here, at an elevation of 10,130 feet, it was a fine mountain stream about 5 yards broad. Dickson Pass has a height of 10,884 feet, and here, before sunrise, the thermometer marked 44°, and rose to 55° at 8 A.M. The forest here was mainly composed of cypress. Crossing over Mount Douglas, 11,796 feet high, where wild strawberries of excellent flavour were gathered, the party reached, at 11 A.M. on June 11th, the top of the north-west peak of Mount Victoria, the highest crest of the Owen Stanley Range. Sir W. Macgregor thus describes the character of this mountain: —"We were camped two nights on Mount Victoria, the 11th and 12th of June, at an altitude of 12,452 feet, that is about 670 feet from the top of the highest peaks, and we therefore can speak of its climate with some degree of authority. The temperature rose in the middle of the day on the tops of the peaks when the sun shone straight on them to 70 degrees; in the morning the grass was all quite white with frost before the rays of the sun reached it. Icicles were brought into camp the afternoon of the day we got to the top; and next day I saw one, the largest I observed, more than an inch in diameter and seven or eight inches long. During the day, from about 10 A.M. till 4 P.M., the temperature in the shade was between 50 and 60 degrees. The sky was blue and cloudless, except when the wind was blowing strong from the south-east, when there was some haze. At night there was no trace of cloud to be seen, except those that lay like lead in the great valleys below, and the stars shone out as brilliantly as on a frosty winter's night in the British Isles. From the dryness of all plants and trees on the Owen Stanley Range it was apparent there had been no rain for several weeks, and the whole range did not show a single cataract or waterfall of any kind, nor even was there the murmuring of a mountain stream to break the deep oppressive silence that reigned on this great lone mountain. Mount Victoria is, during this season at least, emphatically a dry mountain, and the same may be said of all the other great mountains of the Owen Stanley Range traversed by us; but yet, strange to say, water oozes from some of the gigantic rocks on the crest of Mount Victoria, and only 200 feet or 300 feet from the top of the south-east peak I caught a small frog which was floating benumbed with cold in a little pool of water, where there was sufficient to enable one to say it was 'running.'"

"The crest of Mount Victoria runs from south-east to north-west, and may be described as composed of six different peaks, but they might be divided differently by different observers. The north-west one and the south-east one are a few feet higher than any of the others, and perhaps fifty or a hundred feet higher than some. It is impossible to say which of these two is the higher; after examining both, the one from the top of the other, I hold them to be of equal height. They are also more easily ascended than the central masses, being broader, longer, and far less rocky. The distance between the north-west and south-east peaks is from a mile to a mile and a quarter in a straight line; the chief portion of two of the intervening peaks lies to the north of this straight

line. Up the sides of the north-west and south-east peaks there are great breaks in the rocks, that are now filled up with *débris* and growing grass, up which one can walk without the least difficulty if sure of one's feet and head, and the top of each is not less than eight or ten yards broad, and at least fifty or sixty yards long. On this nearly level ground made up of decomposed rock there grew flowering moss and heath, and it was easy to drive a peg a foot or two into the ground on which to rest the compass in taking angles. So easy is the ascent of these two peaks, that I walked with hobnailed boots right up the north and down the south side of each, without having to creep, scramble, or use any support. But it is very different with the central peaks, to the top of all of which I climbed only after tremendous exertion. The upper hundred feet or more is usually perfectly bare rock, sometimes nearly perpendicular, sometimes overhanging; but patience will enable one to get to the top of each of them if one is prepared to incur a little risk. Fortunately the surface of these rocks is rough, and provides good footing, and supplies holding ground for the fingers. The different peaks, or parts of the same peak, are sometimes separated by chasms many scores of feet in depth, so that to pass from peak to peak, a somewhat perilous descent and a laborious ascent have to be undertaken, often several times, before a way to the bottom or top can be found. Great rocky precipitous buttresses are thrown out by the mountain, exceeding 12,000 feet in height, two on the northern side, two on the southern side, and a mighty one on the south-east. and all of these are bristling with peaks and pinnacle-like rocks, and contain hundreds of inaccessible crags and precipices, more than enough to try one's resources in bestowing names, were they each to be specified."

Of the Owen Stanley Range and the position of Mount Victoria in it, Sir W. Macgregor says:—"Mount Victoria is far from being the isolated block it has been customary to represent it. It is simply the eastern end of the Owen Stanley Range, which runs without any break, as one continuous whole, from the south-east end of Mount Victoria until the range meets Mount Griffith and Mount Scratchley; the length of this part of the range (for it continues further west, into Mount Thynne and Mount Lilley) is about twenty to twenty-five miles. The lowest part of the Owen Stanley Range from the east end of Mount Victoria to the junction mentioned is Dickson Pass, which, as already stated, is 10,884 feet in height. The range ends at the east in Mount Victoria, beyond which there are a number of low rounded hills separating it from the range in which Mount Obree is situated, a range which trends away northwards and forms one side of a large valley, which will be mentioned again. It is therefore quite erroneous, from a geographical point of view, to speak of Mount Obree as being part of the Owen Stanley Range, but the low country that intervenes between the ranges cannot, in all probability, be seen from Mount Obree itself by one looking thence towards Mount Victoria, and it is not distinct from the coast."

From Mount Victoria also the orography of a large part of the south-eastern peninsula of New Guinea might be studied. Of the mountains to the north of the Owen Stanley Range, Sir W. Macgregor gives the following account:—

"Mr. Cameron's calculations and my observations made the height of Mount Victoria 13,121 feet, an estimate that comes very near to that given on maps and charts, 13,205. This close approximation was not expected, as Mount Obree is entered on our charts as 10,246 feet high, and was found by Mr. Cuthbertson (*vide Report of Royal Geographical Society of Victoria*, vol. v., part ii.) to be only 8000 feet. But Mr. G. Hunter and some of the natives that went on that expedition say they did not go to the highest point of the Mount Obree Range, and Mr. Hunter says distinctly that he had a glimpse of a peak about 1500 feet higher than the one ascended, lying some distance to the north of it. This may account for the above great discrepancy between the estimated altitude and that ascertained by Mr. Cuthbertson. The weather, it appears, was so thick at the time that only occasional glimpses could be had of the neighbouring mountains. But, of course, all these measurements, my own included, are only approximate."

"The view northward from the top of Mount Victoria was of the greatest interest. It has been already mentioned that the Owen Stanley Range meets Mount Griffith and Mount Scratchley. The first sight of the top of this latter mountain was had from the top of Mount Knutsford, whence it could be seen rising at some distance over Winter Height. It presents a bold, rocky, serrated crest, with well-defined outline. Like Mount Victoria, it is at the top destitute of trees, and for 500 feet downwards consists of bare rocks or patches of brownish grass. It is about 12,250 feet high. It runs in a north-easterly direction for three or four miles, and then opens out into two great ridges, which run down for about half a score of miles to end opposite Mounts Gillies and Parkes. A few miles further north than Mount Scratchley, and running nearly in the same direction, is the second highest mountain in the Possession, so far as at present known. To this mountain I have given the name of Albert Edward, in honour of His Royal Highness the Prince of Wales. About 1000 feet of the top of this mountain is treeless, consisting of rock partly bare, partly grass-covered. Only some four or five miles of the crest of this mountain were visible from Mount Victoria. Its height has been estimated at 12,750 feet."

The country between Mount Victoria and the north coast, which is some fifteen or twenty miles more distant than the south coast, is far less mountainous than in other directions. Within 90 degrees east of magnetic north only two great mountains could be seen, Mount Gillies and Mount Parkes, evidently separated from one another and from the Owen Stanley Range. Their height is probably 7000 to 8000 feet. Mount Gillies, the more westerly of the two, is a rounded mountain clothed with unbroken forest. It runs in a north-easterly direction, and cannot be less than fifteen to twenty miles long. It is separated from Mount Scratchley and Albert Edward on the west by a valley a couple of miles wide, and from Mount Parkes on the east by a river. The latter mountain has similar features, and runs for twenty-five to thirty miles nearly parallel to the Owen Stanley Range. A valley, not less than thirty miles long, and on an average three or four broad, runs between Mount Parkes on the one side and Mounts Scratchley, Douglas,

Victoria, and the end of the Mount Obree Range on the other. Some rivers could be seen in the direction of Mount Parkes and Mount Gillies, but their course could not be determined.

As regards nomenclature, Sir W. Macgregor retained the native names in the few cases in which they could be obtained. The names of the mountains he intended to form a permanent record of those concerned in forming British New Guinea.

Sir William Macgregor was unable to identify Huxley Pinnacle and other peaks named by Mr. H. O. Forbes. Referring to this subject he remarks:—

"That gentleman is undoubtedly a competent and careful observer, but his nearest approach to Mount Victoria was at such a distance from that mountain that, on account of the rugged and mountainous nature of the country, we have found it far from easy to determine how many great mountains or mountain spurs intervened between Mr. Forbes and Mount Victoria with the Owen Stanley Range beyond it. That there were such is plain from the position he assigns to the Brown River. Mr. Forbes had clearly been looking at the south-east end of Mount Victoria, so that the mountain has shut off from his view its great extension on the north-west into the Owen Stanley Range. Mr. Forbes would probably also look into the deep, dark glen that separates Mount Knutsford from the central ridge of the Owen Stanley Range, and which looks at a distance of a few miles as if it cut off Mount Victoria from the part of the range lying to the north-west. This appearance at first deceived us when on Mount Musgrave. Hence, Mount Victoria has presented to Mr. Forbes, somewhere south-east of it, the appearance of being an isolated pyramidal block, which, as has been shown, is far from being the case."

The difficulties encountered in this expedition were considerable. It was often impossible to advance more than three or four miles in a day, owing to the rugged ground and dense vegetation, so that it took more than four weeks of actual marching to reach Mount Victoria, whereas the return journey to the coast, along paths already cut, occupied only twelve days. Also many of the men suffered severely from fever, though fortunately only one succumbed to disease.

Geological specimens and collections of birds, reptiles, insects, and plants were brought back, which were forwarded to Brisbane for examination by Baron Sir F. von Mueller and other scientists. From the report of Mr. W. H. Rands it appears that the whole region consists almost entirely of schists, which become more highly metamorphosed as Mounts Musgrave and Victoria are approached: on the latter they are very micaceous, highly crystalline, and closely approaching to gneiss. Slight traces of gold were detected in specimens from a creek on Mount Belford and from the Vanapa River, but not sufficient to warrant the assumption that this mineral exists in any considerable quantity. No other minerals were discovered. Among the birds was a new genus of bower-bird obtained on Mount Knutsford, which was named after Sir W. Macgregor, and received the generic name of *Cnemophilus*. A second bower-bird of the genus *Amblyornis* was named after Lady Macgregor: a new honey-eater

of the genus *Melirrhophetes*, and a fly-catcher, *Todopsis*, after members of the expedition. Perhaps the most interesting result of the ornithological investigations is that the decided change of climate observed on the elevated parts of the country is not accompanied by a change in the types of bird life, no forms characteristic of colder latitudes having been discovered. The collection contains eight new species. Most of the snakes and lizards are perfectly harmless. The sole exemplar of the Batrachians is a little frog, a new species of the genus *Microhyla*. A new land shell, *Rhytida globosa*, was brought from the very summit of Mount Victoria. Baron von Mueller remarks on the large number of southern upland forms present in New Guinea. Some hitherto found only in Borneo, and even a few of such British plants as are not quite cosmopolitan, were collected in the Owen Stanley Range. There is also a large display of ericaceous plants, so rarely found in Australia. Two specimens, *Ischnea elachoglossa* and *Decatoca Spenceri*, represent new genera. None of the collections here referred to is by any means exhaustive, but they give at least some insight into the geology, fauna, and flora of the country.

Sir W. Macgregor has lately been exploring the Fly River, as was mentioned in the *Magazine* of last month. The last news received from him was contained in a telegram published in the Melbourne *Daily Telegraph*, February 21, 1890:—"Left Fly estuary 26th December; above d'Alberti's furthest point, 5° 54′ S. lat., Fly divides into two branches of equal size. Followed one, named by me the Palmer, for eight days to the frontier. Whale-boat stopped in Palmer five miles from mouth, and a dozen miles from the German boundary. The first mountains are on the frontier, but we did not explore them nor cross the German boundary. Caird, a Malay of the party, was wounded by an arrow, but was at work again within a week. We reached the frontier, and returned here without firing a shot at the natives. Peaceful relations have been established for nearly the whole way. We have spent five weeks and four days on the whole tour out and back. Climate good; health of party fair; country disappointing; natives not numerous."

## PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

Mr. Paul du Chaillu read the paper we publish as our first article this month at meetings of the Society held as under:—

(1) In Glasgow, on Tuesday evening, 15th April, in conjunction with the Philosophical Society of Glasgow. Mr. W. Renny Watson, Chairman of the Glasgow Branch of the Society, who presided, moved the vote of thanks to the lecturer. (2) In Edinburgh, on Thursday evening, 18th April. Sir Thomas Clark, Bart., Vice-President, presided. Dr. James Burgess moved, and Mr. Scott Dalgleish seconded, the vote of thanks to the lecturer. (3) In Dundee, on Monday evening, 21st April. Principal Peterson, Chairman of the Branch, who presided, moved the vote of thanks to Mr. Du Chaillu. (4) In Aberdeen, on Tuesday evening, 22d April, Lord Provost Stewart, Chairman of the Branch, in the Chair. Professor Pirie moved, and the Rev. George A. Smith seconded, the vote of thanks to the Lecturer.

# GEOGRAPHICAL NOTES.

## EUROPE.

**Influence of Forests on the Climate of Sweden.**—Dr. H. E. Hamberg has published the third part of his work on this subject. He is particular in stating that his deductions apply to Sweden only, but, doubtless, many of them hold good for other countries also. As reported in the *Quarterly Journal of the R. Meteorological Society*, October 1889, he maintains that the quantity of moisture supplied to the atmosphere from forest lands considerably exceeds that supplied by an equal area of bare soil, but, this moisture being carried off at once by the winds, Sweden itself derives scarcely any perceptible benefit from it, and the humidity of the cultivated patches in forest districts is appreciably the same as on cultivated plains. Lakes, large swamps, and marshes have a much greater effect on the humidity of a country, but it is doubtful whether their drainage would materially affect vegetation, for plants do not absorb moisture directly from the air, and a considerable difference of humidity in different years exercises no deleterious effect on vegetation. Forests often keep up the humidity of the soil by affording shelter against drying winds. In this way may be explained the greater dryness said to have prevailed in Gothland since its deforestation. Another effect of forests is an increase of dew, attributable not to a larger amount of vapour, but to the increase of radiation induced by their presence. But this increase of dew brings with it lower temperature and hoar frosts, so that a farmer having command of artificial irrigation, and whose fields are sheltered from noxious winds by hills or any other kind of screen, looks with no favourable eyes on the forests that surround him. In conclusion, Dr. Hamberg believes that if forests do not materially modify the amount of rain, which they have not been proved to do [see on this point Major Powell, *S. G. M.*, vol. v. 152], the humidity of the lower stratum of air would not be affected by their removal to an extent injurious to vegetation.

**Earthquakes in Italy.**—The *Bollettino Meteorico*, No. 337, gives an account of the seismic disturbances observed in Italy during the latter months of 1889. Tolmezzo was the centre of the earliest disturbances, which attained a maximum on August 26th. The phenomenon was repeated on October 12th, but the direction of the concussion was changed from NW.-SE. to WSW.-ENE. On this occasion the springs on Mount Caneva became turbid—an unusual occurrence. Shocks accompanied by rumbling noises were observed daily during October, and very frequently in November. During the latter month disturbances spread through the Roman and Neapolitan territories, and, towards the close, violent shocks were felt on the east coast of Sicily. On December 8th, after repeated shocks in the neighbourhood of Lake Garda, the earthquake exhibited marked violence near Parma and Reggio in Emilia, while the mud volcano at Quercia di Salso, five miles from Reggio, gave unwonted signs of activity, ejecting lava, stones, and ashes.—*Boll. della Soc. Geog. Italiana*, Vol. iii. Fasc. ii.

**The Western Part of the Illyrian Mountain System.**—An article on the configuration of this system appeared in the *Mitteilungen der k. k. Geog. Ges. in Wien*, Bd. 32, Nos. viii. and ix. The Illyrian coast region falls naturally into four divisions, of which the first extends from the Kulpa River in the north to the line marked out by the rivers Zermania, Butisnica, and Unna; the second lies between the Zermania, the Butisnica, and the Narenta; the third comprises the mountainous country to the south-east of the Narenta, and the fourth is composed of the islands. The whole of this country, as well as parts of the highlands of Bosnia and Montenegro, display

the Karst character, that is, the formation of the ground is the same as in the Karst hills north of Istria. Instead of ordinary valleys, enclosed basins are met with, having subterranean outlets. These often occur in descending series, each basin emptying itself into the one next below it. Small depressions also are formed in the shape of a funnel, the apex of which is in time filled with detritus. The rock is carbonate of lime. The greater part of the country is bare or covered with poor grass, which springs up in tufts between the stones. Low bushes grow also among them, but forests are to be found only in the less accessible parts of the mountains. The article referred to gives a full account of the groups into which the mountains are divided, and is accompanied by a very complete map.

## ASIA.

**Central Asia.**—*Petermann's Mitteilungen*, Bd. 36, No. 3, contains information concerning the explorations of Colonel Pevtzov's expedition in the region south of Karghalik. A long stay was made in Aktchi-kabak, a country lying some thirty miles south of Kugiar, and here various observations were recorded and specimens collected. During this time also, M. Bogdanovitch, the geologist of the expedition, made an excursion towards the frontier of Ladak. He crossed the Tiznaf, and explored several of the tributaries on its left bank. He describes the country as extremely fertile, abounding in pine forests and mountain pastures, and thickly peopled. Ascending one of the side valleys, the Pakhpa, he crossed the Takhtakorum Pass (about 16,000 feet high) and descended to the Upper Yarkand River, or Raskum Daria. M. Bogdanovitch was prevented from ascending the valley to the Yangi Pass by the flooded state of the river. As far as Pil (Gil ?) the valley is uninhabited. The country is a confused assemblage of lofty mountains, deeply eroded and without any clearly defined axis. Little snow is to be seen in summer, and only one glacier was noticed, which did not descend lower than 14,700 feet above the sea-level; nor were traces visible of old glaciers and moraines lower than about 13,700 feet. The hilly country to the west of Kugiar is everywhere covered with deep layers of löss, sometimes 50 feet thick, the highest Takhtakorum mountains alone being free. In the lower parts of the valleys between Kugiar and Karghalik the löss is thinner and more sandy. Here also is a low chain of hills formed of conglomerates and sandstone, which M. Bogdanovitch considers to be of Tertiary origin. Higher up in the mountains sand- and limestones crop out with a fauna typical of the coal period. The limestones are rich in *Fusulina*, crinoids, *Spirifera*, and *Producta*: the sandstone contains some vegetable remains. These carboniferous strata extend to Sanju, and even further eastwards. Further to the west and south-west the mountains are formed of clay and chlorite slates, quartzite, dolomite, and diorite. The highest summits are composed of granite and syenite.

It was stated in the *S.G.M.*, vol. vi. p. 155, that Colonel Pevtzov intended to search for a pass through the Kuen Lun Mountains into Tibet. *The Times*, Feb. 18, 1890, announced that a pass practicable for horses had been found at a place called Saryk Tong, ninety miles south of Nia. It is used by the Kashgarians, who cross it in summer in search of gold. Colonel Pevtzov was to pass the winter at Nia.

A letter from M. Bonvalot, dated Charkalyk, Nov. 14th, 1889, has been published in the *Compte Rendu*, No. 5, 1890, of the Paris Geographical Society. After leaving Korla, the party sometimes followed either the route of Przhevalsky or that of Carey. The country traversed was for the most part a salt desert, relieved only by a few tamarisks; reeds and grass grow near the marshes, and *tongra* wood (*Populus diversifolia*) near the river Tarim, where also are situated the wretched villages of the Turko-Mongolian population, who are in the lowest

state of barbarism and live by the chase. Around Charkalyk the native inhabitants are mingled with Khotanli, who have introduced among them the arts of sowing and grinding corn. One or two of the party visited the Kara-kurchun, or -kuchun, as the western part of Lob Nor is named, the eastern part being called Kara-buran. No large lake exists, but only a succession of swamps and shallow pools, of which the largest lie towards the east, where also stands the miserable village of Lob. This name has been given by the traders who pass through the place in caravans, and is unknown in the neighbourhood. The quantity of water in Lob Nor is greatly affected by the political situation : now that peace reigns, and land is consequently irrigated, the water has diminished.

**China and Manchuria.**—The Chinese and the Manchurians have, from the earliest times, adopted very opposite modes of life. The former have always been peaceful tillers of the soil, to whom war was a necessary evil, while among the latter it was the chief aim in life. Accordingly, their political organisation has also been different. The Chinese owned the ground they cultivated, paying only a tax to the Government in return for the security assured to them. The army was held in so little esteem that at one time it was composed of convicts. In Manchuria, on the other hand, the land belonged to the Khan, who gave pay to the men under his command. When the Manchus conquered the empire, about 1640, they did not attempt to overturn the organisation then existing in China proper ; but they upheld their own organisation in Manchuria, establishing in 1683 a military government, and dividing the country into three provinces, each under the command of a Tartar marshal. Thus the Pekin Government has helped to preserve the distinctive characteristics of these races. But the force of circumstances has overcome all obstacles, and for some time past the process of assimilation has been going on in Manchuria. Like all countries inhabited by men who live principally by the chase, these three provinces were very thinly peopled. The Chinese then crept in stealthily and settled on plots of ground which they bought from the owners, or pretended owners, and often formed considerable villages before the Government was aware of their presence. On the other hand, the vigour of the Manchu race somewhat declined ; the soldier ceased to be a proud warrior, and became a poor wretch hardly able to exist on his miserable pay. The Government was therefore constrained, in 1865, to abolish compulsory military service, so that Manchus may now become merchants and agriculturists like the Chinese. But the advance of the Russians, and especially their occupation of the coast of Manchuria, has convinced the Chinese Government of the necessity for consolidation and centralisation. The marshal of Fong-Tien, the southermost province, was, in 1876, invested with the powers of a viceroy, and the mayor of the town of Mukden was raised to the position of a provincial governor ; and Chinese were admitted to posts in the public service. Under this new form of administration it has been possible to introduce the Chinese tenure of land, and to impose a land-tax. The Government now perceives also the absurdity of the prohibitions against mining which used to be in force, and seeks to derive profit for itself from these undertakings. In 1888 it decided to work the auriferous deposits of the Mo-Ko, an affluent of the Amur.—*Bulletin de la Soc. Géog. Comm. du Havre,* Sept.-Oct. 1889.

**The Coral Reefs of Rameswaram Island.**—We have already (vol. v., p. 445) briefly alluded to Mr. Bruce Foote's visit to Rameswaram Island, and now subjoin a summary of the results of his observations on the coral reefs there presented. The island is the most westerly of that chain, stretching between Ceylon and India, known as Adam's Bridge. The coral formations consist of a fringing reef and an upraised reef, the latter forming a large portion of the north coast. The

remainder of the island is formed of blown sand, resting, towards the north, on the upraised reef. Towards the south the soil is nothing but sand, thrown up by the strong surf which beats at the head of the Gulf of Manaar, and, afterwards, carried forward by the wind. At Pamban the shore is largely composed of broken coral, partly derived from the outlying fringe, but principally from the dead, upraised reef. These reefs unite at a few yards from the line of the present beach, and the elevation of the upraised coral appears to have been of recent date, as the fossil organisms enclosed in it have now their living representatives in the vicinity. In the shallow water near the shore, the corals forming the fringing reef are *Porites* and *Meandrina*, growing in melon-shaped masses, slightly flattened on the top. The live polyps of the *Porites* were found to be pink or pinkish lavender in colour, the other being green ; one small patch of the former, however, was of a vivid scarlet, preserving its hue for an unusually long time after removal from the water. The upper parts of the melon-shaped bunches were almost invariably dead, but with living polyps on the sides. This is accounted for by the flattened top forming a resting-place for the mud and sand, with which the water is here charged, falling down upon the corals. Madrepores were the common kinds found on the outer edges of the reef and in deeper water. Here, also, there was much dead coral, although the water appeared limpid and pure. Nevertheless, as there are large mud-banks lying off this part of the island it is quite possible that, although the water appears to the eye clear and pure, there may be quite enough impurity, carried in suspension and in a very fine state, to injuriously affect life. This is all the more likely, as a strong current here sweeps over the reef. At least three species of Madrepores were observed here. Quantities of pumice were observed upon the beach, bearing evidence of long immersion in the sea. The blocks varied in size from that of the head of a pin up to that of the head of a child. As nothing of the kind was upon the island at the date of Mr. Foote's previous visit in 1882, it appears likely that the pumice came from Krakatoa during the terrible eruption of 1883. The strait between the island and mainland is nearly bridged over by a reef of coral sandstone, supposed to be a westerly extension of the upraised reef, and rises, in detached portions, above the water like a series of gigantic stepping-stones. Mr. Foote describes the upraised reef in considerable detail. Its different parts present variety of structure, consisting, in some places, of masses of dead coral which have grown one over the other, and are now presented *in situ*. Again, at other points, the coral is broken, jumbled, and thrown together, evidently by wave action, mixed with sand and fractured shells, and all held together by a distinctly calcareous cement. At other places the reef consists of a coarse grit of comminuted coral and shells, so compacted together as to be found useful as a coarse building-stone.

Kursaddi Island is a fine atoll, and presents, with its neighbours, Pallivaset and Palli, the usual low surface of such islands, varied occasionally by heaps of blown sand.

Besides his observations on the reef, Mr. Foote gives an account of the marine fauna and flora, of the antiquities of the island, its people, and other matters of interest. Altogether, Rameswaram Island appears to offer attractions of no mean order to the scientific student and collector.

**The Oby Islands.**—Mr. J. Stormer has published a short description of these little-known islands. It is very defective, for the interior of Great Oby has never been visited by a European, and few excursions have been made even in the smaller islands. The island Loyang or Lukisung, marked on even the more recent charts as lying to the east of Great Oby, does not exist, unless the low-lying eastern part

of Great Oby be considered an island by itself. The larger islands appear to be of very old formation ; no traces have as yet been found of volcanic activity, such as lava, warm springs, etc. According to Dr. Winter, coal and lignite are to be found in these islands. Mr. Stormer's description is accompanied by a map on the scale 1 : 50,000.—*Petermann's Mitteilungen*, Bd. xxxv., No. 11.

## AFRICA.

**Tekna.**—Independent Tekna extends along the coast of the Atlantic from the Wadi Draa (frontier of Marocco), 28° 42′ N. lat., to Cape Bojador, 26° 12′ N. lat., where it adjoins the possessions of the Spanish company of the Rio de Oro. The name is also applied to the country across the Draa, which is subject to the Sultan of Marocco. The coast is in most places sandy, and is being degraded by the sea. The wadis, which only at certain seasons hold water, are choked with sand and obstructed by bars. From Cape Juby northwards to Cape Affemir the shore is rocky, and here is situated the only small natural harbour, Tarfaya, on which stands the factory of the North-west Africa Company. Elsewhere the landing of cargo in boats is dangerous or impossible, but the small basin called Port Victoria is protected by a line of reefs. The port of Tarfaya can be entered only by vessels of small draught. The entrance may be improved by deepening the bar opposite the castle. Vessels of heavy tonnage find anchorage in the open roadstead as far as half a mile west of the castle. The appearance of the coast of Tekna is, on the whole, dry, sandy, and monotonous. From Wadi Draa to Cape Morro the soil is very sterile. At about eight miles from Cape Juby the sandy hills begin to be covered with tamarisks. At Tarfaya the soil is arid, and its sterility extends inland to a distance of from two to three miles, where the Aftut oasis begins. This is a slightly undulating plateau stretching about 12 miles in a southerly direction, and having an elevation of 250 to 300 feet. The soil, resembling that of Marocco and Andalusia in its composition and reddish colour, rests on a calcareous rock. The wild vegetation consists of large close bushes, cactus, and other fleshy thorny plants. Here grow the *hanafiz* (the bark of which is used to make tan), henna, and the parasite orchella, which yields a red dye. Beyond the Aftut, to the south-east, is another arid tract interspersed with saline *shotts*, from whence the traveller gains the plain of Durah, 25 to 30 miles from Tarfaya. This plain extends for a length of 30 to 35 miles, gradually expanding until it meets the bank of the Saghiet-el-Hamra, a wadi which descends from the slopes of the Anti-Atlas and enters the Atlantic by a very large delta about 70 miles south of Cape Juby. Near the Durah plain its bed has a breadth of from 1000 to 3000 yards, and a total depth of 65-80 feet. A few threads of water usually meander through it, but in the rainy season it is entirely covered.

The climate of Tekna is considered healthy. On the coast the thermometer does not generally rise higher than 86° F. in the day-time, and sinks to 60° or 66° F. at night : in the interior it rises to 100° or 104° F. in the dry season. The native inhabitants bear the general appellations of Ait-el-Jamel and Bilâl, but are also divided into a number of small tribes. Most of them live in tents, and many are nomads. The population is very thinly scattered. In race, the inhabitants are Moors and Arabs, the latter being distinguishable by their taller stature, but they live together as one people. They are eager to engage in commercial transactions, but, like their kinsmen in other parts, are rapacious and deceitful. Europeans can, however, manage them well by firmness and patience.—*Le Mouvement Géographique*, 22d Sept. 1889.

**The French Congo.**—M. Fourneau has made an expedition through the interior of the Gabun territory. He started from Njolé, on the Ogowé, and travelled due

north till he reached Crampel's route by the sources of the Campo, whence he reached the coast at the mouth of that river. The whole journey was accomplished in sixty-five days. In this country rise the streams which feed the Gabun, Muni, Benito, and Campo.—*Compte Rendu* of the Paris Geographical Society, January 17th, 1890.

**Exploration of the Mongalla.**—An account by M. Hodister, agent of the "Société du Haut Congo," of his exploration of this tributary was published in the *Mouvement Géographique*, January 26th, 1890. It appears that the basin of this river extends further to the north than has been supposed, and that the principal branch is that which comes from the east, and bears the name of Monai in its lower, and of Dua in its middle and upper, courses. Villages built on piles stand on the river side, where the banks are swampy, and are inhabited by the Njingalis. These natives are shock-headed, dirty, and almost naked, but live to a greater age than men on other rivers. At one place the river widens out into a pool about 35 miles long by 1¼ miles broad. A short distance above, M. Hodister discovered a mountain almost all of iron and covered with magnificent forest, in which all kinds of African trees were represented.

**The Lomami.**—M. Janssen, Governor-General of the Congo State, left Isangi, at the confluence of the Lomami, on October 29th, 1889, and ascended that river on board the *Ville de Bruxelles*. The furthest camping-ground of Delcommune (*vide S. G. M.*, vol. v., 502) was reached in 14 days, the vessel having actually steamed 116 hours. Soon after leaving this spot it became evident that all hopes of finding a waterway to the south along this river must be abandoned. Large patches of moss were observed floating with the current, which became more and more rapid. At last, only four and a half hours' journey above the furthest point reached by the *Roi des Belges*, the progress of the steamer was arrested by unnavigable rapids, rushing through a gorge only 55-65 yards across, whereas a little below the river has a breadth of 220 yards. M. Janssen explored the ground, and discovered a regular cascade about three and a half to four miles above the place where the steamer anchored, and the floating moss still further up the river indicated that other rapids must exist. The latitude of these rapids was found to be 4° 27′ 2″ S. But though the Lomami cannot be navigated further up, it is still of the greatest importance as a highway to the south, approaching, as it does, to within fifty or sixty miles of Nyangwé, to which place a path for porterage or a railway on the Decauville system might be made. The *Ville de Bruxelles* descended the river in fifty-one hours of actual steaming. A military post was established at Bena-Kamba (latitude 4°), the only village where the expedition was received in a friendly manner.—*Le Mouvement Géographique*, 23d Feb. 1890.

**The Country of the Bonyai.**—Superintendent Knothe, of the Berlin Missionary Society, made an expedition into Matabele-land in June, July, and August 1888. He left his station at Mphome on June 25th, accompanied by Messrs. H. and W. Posselt, and, passing the salt-pan at the foot of the Zoutpansberg, advanced northwards to the Limpopo, and then in a north-easterly direction to the Bubye River. Having crossed this stream, the missionaries turned northwards to the Singoa mountain, where they left the wagons and made an excursion northwards beyond the Lahsa mountain. As the Matabele would not suffer them to advance further, they turned back, and, having met the wagons at Mount Lahsa, journeyed westwards over the river Lunde; but, being in danger of attack, they retreated as far as the Bubye by the way they came, and then took the route to Malingotse. Here the wagons went back to the place where they had before crossed the Limpopo, while the missionaries

visited the small tribe of the Mapæ on the northern bank of the river, and then returned home by a more direct way. The country explored, which has hitherto been visited only by traders and hunters, forms a table-land 1600 to 2000 feet above the sea-level, in which the rivers flow along deeply excavated beds. The Limpopo here lies about 1300 feet above the sea. Where the party crossed, it was some 700 paces broad, and, at that time in the dry winter season, the water did not rise above the floor of the wagon. The river is bordered by reeds, and its banks are clothed with woods of gigantic trees. The whole country is well wooded : among the species may be noted mimosas, fan-leaved palms, and monkey bread-fruit (*Adansonia digitata*). The mountains, formed of fantastically-shaped and gigantic masses of rock, are singularly imposing. The Bonyai tribes—refugees from the tyranny of the Matabele—dwell there ; and only these inaccessible rocks have preserved them from total extinction. Their language is related to Sesuto, but is so modified that a Basuto cannot understand it. The religion of the Bonyai differs but little from that of the Basuto. The Bonyai are much more skilful than the latter people in industrial arts ; they weave, and work iron and copper. Maize, coffee, beans, peas, lentils, etc. are cultivated. There is no nicety shown in the choice of meats,—panthers, baboons, and rats being eaten readily.—*Petermann's Mitteilungen*, Bd. xxxvi., No. 2.

**Ugweno.**—After his ascent of Kilima-njaro Dr. Meyer made an excursion into the district of Ugweno, which lies to the west of Lake Yipe. He entered this mountainous land from the Kabe country on the west, but, being at first received with distrust by the inhabitants and constantly robbed when they became convinced of his friendly disposition, he turned southwards towards Usangi (Usanga is incorrect according to Dr. Meyer), where the people are accustomed to the visits of Swaheli traders. Before descending to the Jego stream, he and Herr Purtscheller climbed the Gamualla mountain, 6160 feet high, from which they obtained a fine view over the whole of Ugweno. Following the Kirongaia valley, through which the Jego flows, the travellers were well received by the chief Naguvu, with whom they stayed two days. Then, crossing the Jego near its confluence with the Junguli, they followed the latter, the chief river of the country, northwards, ascending the Zungo and Ngovi peaks (4360 and 5700 feet high, respectively). The people in the northern part of Ugweno, being, like those on the west, exposed to the assaults of the Mandara, showed the same distrust of strangers. Leaving Ugweno, Dr. Meyer crossed the papyrus swamp, which forms a prolongation of the Yipe lake towards the west and is drained by the Ruvu, and so regained Marangu. The highlands are formed of gneiss, and are surrounded on the east, north, and west by volcanic products of later date. The most important group of mountains is the Usangi chain, of which Gamualla, Jego, etc., are the highest peaks. In the northern part the summits Kiberenge, Lambo, and Ngovi follow one another in a direction approximately north-east. The watershed is formed by a comparatively low chain of hills connecting Lambo and Ngovi. None of the streams reaches the Lake Yipe or the Ruvu : those that descend even as far as the foot of the mountains are lost in swamps. The north-west is entirely denuded of inhabitants, owing to the repeated raids of the Mandara and the Masai. The Wagweno are a tribe closely resembling the Wambugu of central Usambara, and dwell chiefly in the middle and southern parts of the country. Bananas are the chief article of food, but potatoes, beans, millet, maize, and sugar are also cultivated. Few cattle are kept, lest they should attract the cupidity of the enemy. Iron is found in the bed of the Jego, and is worked in the same manner as among the Wajagga, but with less skill. Only the

north-western part and the outermost edges of this mountain district are covered with forests ; elsewhere the untilled ground is covered with low bushes and grass. Seeing that the mean elevation is about 4600 feet, it is probable that the produce of this country would not fall far short of that of Usambara, were the inhabitants permitted to labour unmolested.—*Petermann's Mitteilungen*, Bd. xxxvi., No. 2.

## AMERICA.

**The Province of Pernambuco.**—The following details concerning this Brazilian province are taken from the *Bulletin de la Soc. de Géog. Comm. du Havre*, September-October, 1889. The province of Pernambuco has an elongated form, stretching westwards to a distance of 620 miles, and measuring only about 125 miles from north to south. Its coast-line is about 130 miles in length. On advancing into the interior in a direct line from the coast, the traveller meets first with the *matta* or forest region, which is a vast plain elevated only a few feet above the sea-level, and gradually widening out from a breadth of 30 miles in the south, to 80 miles in the north, of the province. This region is bounded on the west by a series of sierras, containing peaks of from 820 to 2600 feet in altitude. Here commences the *sertão* or interior, of which these mountains, intersected by deep valleys and covered with inaccessible forests, are but the threshold, though over 150 miles in depth. Beyond lies an arid plain, where only a few knolls relieve the monotony ; but in the neighbourhood of Triumpho, on the north, and Floresta, on the south, the soil reverts to its former fertility. Ironwood, cedars, laurels, ivory palms, the jacaranda, peaches, guavas, arrowroot, manioc, and, in short, most of the trees and fruits of South America, grow in this province. The jaguar, red wolf, tapir, etc., are found here ; rodents are very numerous, especially the cavy, and the fauna includes two marsupials resembling closely the Australian opossum. Parrots, toucans, and other birds of brilliant and varied plumage abound in the forests. One of the most beautiful, and at the same time most poisonous, reptiles is the coral snake, of which there are two varieties, the red and the white. Gold has been found in some of the mountain streams, but there is no reason to suppose that this mineral exists here in any large quantity. Saltpetre and crystallised salt are worked to a small extent, but the mineral wealth of the country is small, and the most important material in local commerce is a fine red and pale yellow clay, from which carafes, flower-vases, and other vessels are formed. The *matta* is the chief seat of agricultural industry. The chief product is sugar, which is exported from Pernambuco to all parts of Brazil. The annual value of the sugar shipped at Recife has risen to £1,900,000, but this includes considerable quantities from the adjoining provinces of Céara, Parahyba, and Alagaos. Next in importance is cotton, which is exported to the value of £880,000 annually. Caoutchouc, maize, manioc, and castor-oil are also exported, but in much smaller quantities. Manufactures are also carried on to a small extent : straw hats, leather, spirits, etc., are made.

There are several towns of 20,000 inhabitants and more, many of which are connected with the capital by the Limoeiro railway and its branches. The rivers are of little use as ways of communication. The San Francisco, which bounds the province on the south, is obstructed in its lower course by rapids. Pernambuco, the capital, is a town of 120,000 inhabitants, situated on three lagoons, with straight, clean streets ; the value of its commerce is about £3,600,000, annually.

**The Island of Santa Maria.**—This island, which lies off the coast of Chili, opposite Arauco Bay, was surveyed in 1886 by Captain A. Wilson in the Chilian gunboat *Magallanes*. It lies eastwards of 73° 34′ W. long., and extends from

36° 58′ to 37° 5′ S. lat. It consists of two parts differing widely in character, namely, an elevated tract rising at most points precipitously from the sea, and a low plain, the Vega, just emerging from the water. The former has its greatest length in the direction of the meridian, and is studded with chains of hills and isolated elevations. The latter is a flat, sandy peninsula, extending from the hilly division of the island towards the mainland. The whole island has an area of 12½ square miles, and a perimeter of about 20 nautical miles. Its greatest length is 7 miles; and its greatest breadth, from Mount Dolores to Espolon Point, nearly 4½. The island terminates to the south in the mountain Huanayes, and to the north in the Cansado. The hills are generally bare, but the valleys, which ascend from the west towards the east, are covered with bushes, grass, and other forage. Of the forests, which probably covered the island in former times, only a few trees are left. Though the Vega is sandy, it is in parts covered with grass; on the eastern side there are banks of shifting sand. The climate is mild and healthy. Mists are of frequent occurrence, but disappear by mid-day. In 1886 the island contained about 160 inhabitants, who gained their living by cattle-keeping and agriculture. They live on the higher part of the island in miserable straw cabins. Fowls, beef, mutton, butter, eggs, and milk can be obtained. Vegetables are not always to be had, and never in large quantities. The sea abounds in fish and edible molluscs. The west coast is dangerous, owing to rocks and shoals, and the east coast is in many places difficult of approach, from sandbanks and shallows. Inglesa Bay, at the north-eastern extremity of the island, affords the best anchorage. It measures 1½ miles across at the entrance, and penetrates half that distance into the land. The line of upheaval is continued to the northwards by the island Farallon and two groups of reefs, the Dormidos de Adentro and the Dormidos de Afuera, with sunken rocks between them. The island Farallon lies 58° to the west of north from the Mount Cansado, and about 10 miles from Pesca Point, to the west of Cansado.—*Annalen der Hydrographie, etc.*, Heft x., 1889.

## AUSTRALIA.

**The County of Croajingolong, Victoria.**—Some notes on the physiography of the western portion of this county by Mr. James Stirling, F.G.S., are published in the *Proceedings of the Royal Society of Victoria*, June 1889. This, the most eastern county of the colony, is bounded on the west by the Snowy River, which rises at an elevation of 6000 to 7000 feet, or more, amid the snow-clad heights of the Australian Alps, and flows in a southerly direction to the sea between huge masses of deeply eroded rock. Descending as it does from the highest elevations in Australia in a direct course to the sea, the river is almost a torrent, except where it traverses the rich alluvial flats of Orbost. Its principal tributary is the Broadribb, which rises in the coast range at Bonang, and drains the western slopes of Mount Ellery and the M'Culloch range, the highest summits in the county. The Snowy River intersects, for the most part, hilly regions of little use for cultivation, and its tributaries are skirted by dense jungle. The flats and spurs towards the coast are already occupied by a body of selectors busily engaged in reclaiming morasses and woodlands. The Bemm and Cann and other smaller streams flow southwards through the central portion of the county. The main watershed line is the coast range, which traverses the northern part of the county in an easterly direction, and throws off lateral ridges to the south. Its highest points are Mount Bowen, at the head of Mountain Creek, Mount Goonmurk (4300 feet), at the head of the Bemm, and Mount Tennyson, on the boundary of the colony towards the head of the Cann River. The most prominent peak in the county is Mount Ellery, on the ridge separating the Broadribb from its affluent, Cabbage-tree Creek.

The M'Culloch Range and Mount Raymond are next in importance. The difference in the amount of excavation along the streams flowing northwards and southwards, respectively, probably points to a greater fall of rain on the southern slopes, which are exposed to the south-westerly and south-easterly humid winds, and, perhaps, share in the warm tropical rains of East Australia. Hence, the most striking features in the vegetation of Croajingolong are the presence of many East Australian types not found elsewhere in Victoria, and the luxuriance of the climbing plants. Another peculiarity is the occurrence of the cabbage palm *Livistona Australis*, far from its tropical home, on Cabbage Creek, where it grows to the height of 100 feet. A list of plants found in the country is given in Mr. Stirling's article. The geology of the district has no peculiar characteristics. In the northern portion silurian slates and sandstones prevail; in the middle a belt of granite extends from east to west; and near the coast pliocene conglomerates overlie miocene gravels, clays, and limestone bands. The only metal extracted in the country is gold, which is found principally in the Bendoc and Bonang districts north of the coast range. There are some copper lodes on the Snowy River, but they have not yet been worked.

**Kangaroo Island.**—This island, which belongs to South Australia, lies in front of the entrance to the Gulf of St. Vincent, and is separated from the mainland by Backstairs Passage, a strait only seven or eight miles broad at the narrowest point. It is about 87 miles long from east to west, 34 miles broad from north to south, and has an area of 1,074,885 acres, of which 64,246 are now private property. At the last census the population consisted of 379 whites: there are no natives. The island was discovered in 1802 by Captain Matthew Flinders, and owes its name to the numerous kangaroos which then existed on it. It remained entirely uninhabited up to 1828, and then colonisation advanced very slowly until, in 1877, the South Australian Government caused a survey to be made, when immigration increased rapidly, and land was bought at high prices for grazing and crops. As the yearly rainfall amounts to from 20 to 23 inches, no doubt was entertained as to the productiveness of the soil; but after two years the Narrow Leaf, a wild plant very difficult to exterminate and most destructive to all other forms of vegetation, spread so rapidly that agriculture was ruined, and the farmers now lead a wretched existence. The kangaroos and the emus disappeared fifty years ago, owing probably to some disease. The wallabies also are much scarcer than they used to be. Their skins fetch a good price, and their flesh, which resembles mutton in flavour, is considered a delicacy. The climate is acknowledged to be excellent, and no better place could be found for a sanatorium. The air is pure, clear, fresh, and bracing, and in the hottest season the nights are cool. The north wind, so trying on the mainland, has a temperature seven to nine degrees lower when it arrives here. The ground is stony on the coast; further inland it is poor and sandy and overgrown with scrub. Bushy eucalyptus of various kinds, thorny acacias, the wild tobacco plant, and the terrible Narrow Leaf are the most common plants. In the centre of the island is a chain of hills whose sides are covered with Stringy Bark (*Eucalyptus obliqua*). Good land capable of cultivation is found only in small patches here and there on the coast and on the Cygnet River. Wheat has been tried without success, but barley yields good crops—20 to 25 bushels an acre in fruitful years. Few cows can be kept owing to the scarcity of grass. Sheep have been fed near Vivonne Bay, but the result has not been satisfactory.

Queenscliffe, Kingscote, Brownlow, Shoal Bay on the north coast, and Vivonne Bay on the south coast, have good landing-places. Queenscliffe, prettily situated on the north-west side of Nepean Bay (35° 42′ S. lat. and 137° 44′ E. long.), is the

chief town. It has a telegraph office, police station, two hotels, and a few private houses.

On the Cygnet, which flows into Nepean Bay about two miles to the east of Queenscliffe, sawmills have been erected to convert the wood of the sugar gum, a kind of eucalyptus, into railway sleepers. This valuable tree grows also on the Rocky River not far from Cape Borda and on other rivers.—*Henry Greffrath in Petermann's Mitteilungen.* Vol. xxxv., No. 9.

## GENERAL.

**On the Height of Land and Depth of Ocean.**—In measuring a number of small areas with the planimeter there is always an instrumental error which gives rise to some discrepancy between the sum of the small areas and the total area as estimated by a single reading. In the measurements of areas in Dr. John Murray's paper on the height of land and depth of ocean in the *S. G. M.*, vol. iv., p. 1 (1888) this error amounted to a defect of about 4·4 per cent. The summaries of areas at each height and depth on the earth's surface corrected for this error are as follows :—

| Land. | First Estimate. Square Miles. | Corrected Estimate. Square Miles. |
|---|---|---|
| Below Sea-level | 317,550 | 331,600 |
| Between 0 and 600 feet | 13,746, 950 | 14,354,150 |
| „ 600 „ 1500 „ | 14,284,400 | 14,915,300 |
| „ 1500 „ 3000 „ | 9,882,350 | 10,318,800 |
| „ 3000 „ 6000 „ | 8,720,250 | 9,105,400 |
| „ 6000 „ 12000 „ | 3,107,750 | 3,245,000 |
| „ 12000 „ 18000 „ | 1,172,800 | 1,224,600 |
| „ 18000 „ 24000 „ | 170,850 | 178,400 |
| Above 24000 „ | 7,800 | 8,150 |
| Total, | 51,410,700 | 53,681,400 |

| Sea. | First Estimate. Square Miles. | Corrected Estimate. Square Miles. |
|---|---|---|
| Between 0 and 100 fathoms | 10,135,250 | 10,582,900 |
| „ 100 „ 500 „ | 7,380,550 | 7,706,500 |
| „ 500 „ 1000 „ | 6,475,200 | 6,761,200 |
| „ 1000 „ 2000 „ | 29,211,200 | 30,501,300 |
| „ 2000 „ 3000 „ | 77,661,650 | 81,092,000 |
| „ 3000 „ 4000 „ | 6,190,400 | 6,463,800 |
| Over 4000 „ | 145,200 | 151,600 |
| Total, | 137,199,450 | 143,259,300 |

The second estimate assigns a somewhat greater proportion of the earth's surface to sea than is assumed in Dr. Murray's papers, but our present knowledge of the relative proportion of land and water within the Arctic and Antarctic Circles is vague enough to fully cover the divergence.

**The North Sea.**—Dr. F. Heincke of Oldenburg was commissioned last autumn by the Section for Deep Sea Fishery in Berlin to conduct an expedition to the North Sea. Its immediate object was to seek out new fishing-grounds, but Dr. Heincke and his companions also collected a large number of specimens which throw fresh light on the distribution of marine species. The observations made of the salinity and temperature of the water will be valuable. The most remarkable

fact ascertained was that, except in a few limited places, no firmly-rooted *algæ* exist, and therefore the fishes which swarm in the North Sea must subsist on floating organisms. The "weed" marked on English charts proves to be composed of *Bryozoa.—Deutsche Geog. Blätter*, Bd. xiii. Heft 1 and 2.

**Deep Oceanic Troughs.**—Professor J. D. Dana discusses in the *American Journal of Science* for March 1889 the subject of deep depressions in ocean beds. He points out that on the bathymetric maps no prominent meridional courses appear in the ranges either of the Pacific or Atlantic, except the axial range of comparatively shallow water in the South Atlantic, and that the lines of depression are so far in harmony with the directions of the mountain ranges in Europe and America, none of which run north and south, except the Urals and a part of the Andes. The oceanic ranges are rarely straight, and transverse ranges cross the main ranges at right angles. Approximate parallelisms exist between distant lines, as between the transverse New Zealand range (35° to the east of north) and that of the east coast of North America; the Mediterranean Sea and the Gulf of Mexico also are remarkable, in that each has three deep basins lying longitudinally. Professor Dana does not believe that the deep oceanic troughs are due to volcanic action, but rather had their foundation at the beginning of the earth's genesis. For though they sometimes exist in the neighbourhood of volcanic regions, such as Hawaii and the Ladrones, they are frequently absent, and, moreover, are to be found where no evidence of volcanic action can be discovered. As a whole, the bed of the Pacific may be said to slope from east to west. The Atlantic slopes from either side of the Dolphin shoal, but is far deeper on the western side than on the eastern. The Indian Ocean, on the contrary, is deepest in its eastern part.

**The Effects of Snow on Soil, Climate, and Weather.**—A pamphlet on this subject, by Professor A. Woeikof of St. Petersburg, has been published by Dr. Penck of Vienna (*Geog. Abhandlungen*, Bd. iii. Heft 3). Professor Woeikof has collected a large number of records of observations in Russia, Bavaria, Sweden, and other countries, and has embodied the conclusions thence deduced in thirty-six theses (p. 104). Many of these are merely particular applications of the well-known laws of the conduction, convection, and radiation of heat. Such are the statements that a covering of snow keeps up the temperature of the ground because it is a bad conductor; that its effect is greater when dry and loose than when wet or subject to pressure; that the air immediately over the snow is cooled down, whereby the strength of the wind is diminished, and the formation and retention of anti-cyclones promoted;—and others. While there is nothing new in these general principles, the explanation which is given of certain cases of abnormal cold seems somewhat incomplete. Professor Woeikof confesses that little is known at present on the subject of snow. He says that a large number of measurements and observations must be taken before any new deductions can be obtained.

**Development of a River.**—Mr. W. M. Morris of Harvard College, in a pamphlet entitled *The Rivers and Valleys of Pennsylvania*, describes the stages through which a river passes. In its infancy the river drains its basin imperfectly, for it is embarrassed by the inequalities of the ground. Hence lakes are formed in all the depressions, evaporation carries off a large proportion of the rainfall, and the ratio of transported soil to rainfall is small. The channels of the streams which combine to form the river are narrow and shallow, and the "divides" between the side-streams are indistinctly marked—in flat countries they are often areas of considerable extent and not ridges at all. In the infantine drainage system of the Red River of the north, these interfluvial spaces are so flat that the water collects

on them in wet weather. As time rolls on the river deepens its channel, and, where differences of hardness in the strata occur, forms cascades. These, however, are of short duration compared to the length of the life of a river; they are gradually left up stream by erosion, and are at length confined to the head-waters. During this period the tributaries deepen their valleys also, and the streams which feed them become more numerous, so that finally the whole district intersected by the main river and its affluents is drained by it, all the water finding channels to carry it to the sea. The river has then arrived at its maturity, as the state is called in Mr. Morris's terminology. It now carries its maximum load, and descends to the sea more gradually and with a more steady flow than during other periods of its existence. Sometimes the lower main stream, being unable to carry off all the detritus, lays it aside on a flood-plain; and when this plain is built up faster than the affluents can fill their valleys, the latter form lakes near their mouths. The growth of the flood-plain also displaces the mouths of the side-streams further down the valley, and occasionally forces a tributary to find a separate outlet to the sea. Having attained its highest degree of development, the river sinks gradually into a gentle old age. The diminished slopes of its valleys cause a corresponding diminution in the velocity of the current and in the quantity of eroded soil. The lower course has therefore leisure to resume its task and carry down to the sea the material piled up on the flood-plain during the period of maximum activity. In the last stage the basin of the river is so worn down, that the stream moves along with a sluggish current and carries only a light load.

Mr. Morris shows also how a side-stream may, if it be able to deepen its bed more rapidly owing to its course being over softer rocks, tap the head-waters of an adjacent stream, and, perhaps, may undergo the same process in its turn. In this way the upper course of a river may be diverted to another channel, the waters which fed this course being collected into one stream, which joins the original bed lower down. Should an upheaval of the ground take place during the life of a river, a more expeditious route to the sea may thereby be provided, while, on the other hand, a depression may flood the lower course, or form open estuaries, to be transformed into deltas later on. Mr. Morris describes the geological formation of Pennsylvania, and illustrates the principles he has laid down by references to the rivers of that State.

**The Mother-Land of the Malayo-Polynesian Peoples.**—Such was the subject of an address recently delivered by Professor Kern of Leyden before the Amsterdam Academy. His investigations rest upon a philological foundation—that is to say, upon a comparative study of all the branches of the Malayo-Polynesian family of speech. In these dialects there is a body of common words which are found either in identically the same forms or only slightly altered. These are assumed to have belonged to the language that was spoken by the Malayo-Polynesian tribes whilst they were still united in one undivided race, though various tribes, and before their dispersal—to what, in fact, might be called the mother-tongue of the race. Although the Negritos of the Philippines, and the inhabitants of New Guinea and of the Micronesian islands, are not of Malayo-Polynesian blood or race, yet in so far as they speak a Malayo-Polynesian language, and the investigation rests upon a basis of comparative philology, the evidence they afford is quite as legitimate as that afforded by the languages of the true Malayo-Polynesians.

Dr. Kern examined first the nomenclature of plants, then that of animals, then of minerals, and so forth. He finds that the sugar-cane, the pisang, the coco-nut palm, and four species of bamboo were known in the mother-country of the Malayo-

Polynesians. This determines the position of that country to a certain extent: it must have lain between the Tropics of Cancer and Capricorn. Nobody asserts that these people migrated westwards; and all *a priori* assumptions favour the view that they migrated eastwards. Hence we must look to south-east Asia for the region we are in quest of. Again, in the mother tongue, the distinction between rice as growing in the field, or paddy (Malay, *padi*), and rice when separated from its husk (Malay, *beras*) is clearly traceable. Now *beras* means *fruit = i.e.* fruit *par excellence;* hence it is fair to infer that it was the principal food of the people who dwelt in the mother-land. According to Roxburgh, however, the original home of rice was Hindustan; from thence it must have been carried to China, where it seems to have been known in prehistoric times. May it not, therefore, quite as readily have been carried to the peninsula of Further India (Anam, Siam, Cambodia, etc.)? It is, nevertheless, curious to note that the Tibetan name for husked rice is *bras*, which bears a remarkable resemblance in sound to the Malay word. Dr. Kern is inclined to believe that rice reached the Tibetans from a Malayo-Polynesian people. That rice was not introduced into the Malay Archipelago from the east, from the islands of the Pacific, is clear from the fact that the people who inhabited those islands knew neither the plant nor its name previous to the appearance of Europeans amongst them. This justifies the further inference, viz., either those people lost all recollection of rice cultivation, or else they emigrated from the mother-country before the plant was introduced there. The names given to the cucumber, stinging-nettle, and other plants, all point to the same conclusion: that the mother-country must have lain between the Tropics. Amongst the animal names none are more common than those of certain creatures that live in the sea, as, for instance, the shark, the cuttle-fish, sea-crab, prawn, and turtle. Whence, there can only be one inference: the mother-land adjoined the sea. Another set of words prove that the Malayo-Polynesians of the mother-country were navigators, not of the coasts and rivers, but of the ocean. The final conclusion at which the learned Professor arrived was that the mother-country must have been situated either on the east coast of Further India, or on one of the islands of the Malay Archipelago. The northern-most line beyond which it could not have lain he takes to be the southern boundary of China, or, in other words, the Tropic of Cancer; whilst southwards we must not go beyond the latitude (8° S.) of Java.

Professor Kern's arguments are carried somewhat further by Herr E. Metzger, from whose paper in *Globus* (Vol. lvii., No. 12) we have gleaned these particulars. Following the reasoning of our esteemed Hon. Corresponding Member, the Malays and Atchinese of Sumatra are certainly not the aborigines of that island: they came from the peninsula of Malacca. That leaves only Borneo and the east coast of Further India for consideration. There is no reason, *primâ facie*, why the Malayo-Polynesian tribes now settled on the mainland may not have immigrated thither from Borneo in ages gone by, except the habit, deeply rooted amongst all sea-going tribes of Malayo-Polynesian blood, of accounting one quarter as the sea-side and the quarter opposite to it as the high-land—a fact that points to a continental region rather than to an island as their mother-land. On the other hand, a large island like Borneo might well be regarded as continental; only, in that case, if Borneo were the mother-country, it is difficult to understand how this vast and not unfertile island comes to be so thinly peopled. It seems more reasonable to suppose that the "mother" race would have spread inland and overrun the whole island before they had ventured to cross the seas in search of new lands. But the most important circumstance—a circumstance which, coming on the top of the preceding arguments, almost decisively settles the matter—is this: the emigration, it is most rational to conceive, was caused by the presence of foreign and more powerful peoples. In the

languages (Anamese, Siamese, Cambodian) of Further India there is a much larger proportion of words of Malayo-Polynesian origin than the present relations of the respective peoples are able to account for. Consequently, only one conclusion is left open to us: these foreign peoples—the Anamese, etc.—must have invaded the mother-country of the Malayo-Polynesians, and, ousting them from their homes, have possessed themselves of the country that heretofore was theirs.

**Explorers in Disguise.**—M. Duveyrier gave some particulars of the death of M. Camille Douls at a recent meeting of the Paris Geographical Society (*Compte Rendu*, 1889, No. 14). He warned M. Douls against assuming a disguise, insisted strongly that, though not an Arab himself, he could detect his European origin by his pronunciation alone, and reminded him that his complexion, gait, and vivacious manner would not escape the quick eyes of the mistrustful inhabitants of the Sahara. M. Camille Douls was, however, over-confident in his good fortune, and added still more to the difficulties of concealment by assuming the character of a *hadji*, to maintain which a thorough acquaintance with the topography of the holy cities of Arabia, Moslem ceremonies, the duties of pilgrims, etc. would be necessary. Ignorance in any little detail connected with these matters would inevitably lead to detection by any brother *hadji*, who wished to recall with him the memories of the most important event of his religious life. At first M. Douls seems to have been successful in his plans; he came from Sinai in the company of pilgrims returning to Marocco, who believed him to be one of themselves, or, at any rate, treated him as such; but, before he reached Reggan, the last oasis on the way to Timbuktu, he was known to be a Frenchman; and the wonder is that he did not at once suffer the fate which befell him shortly after. Disguised as a simple Mohammedan, the Arabs would suspect him of having polluted by his presence their holy places and rites, but by calling himself a *hadji* he had undoubtedly profaned a sacred title. If a traveller passes through a country openly, where he goes and what he does are known to all, but a disguise excites the suspicion of the inhabitants. Even in France, if a German gave the slightest ground for suspicion that he was trying to conceal his nationality, he would be arrested as a spy. But the case is aggravated among a fanatical people like the Arabs, where the assumption of a disguise implies a pretended adherence to the Mohammedan faith. M. Camille Douls is not the only victim of such injudicious attempts. In 1874, Dournaux-Dupéré and his companion Joubert were massacred near Aghahar-Mellen, and in 1887 Mr. Rockhill was discovered in Tibet, but fortunately escaped with the loss of his baggage only (*S. G. M.*, vol. v., p. 611).

## MISCELLANEOUS.

**Mr. H. M. Stanley** returned to London on 26th April.

A **Stanley and African Exhibition** has been opened in London. The exhibits illustrate life and travel in Africa, and are admirably arranged in geographical order. Some instructive large-scale maps by Mr. Ravenstein are shown.

The Japanese Government intends to erect a **Meteorological Station** on the Liu-Kiu Islands, which will fill the gap now vacant in the line Hongkong, Manila, Shanghai, and Tokio, and promises to be especially useful for observing the track of the East Asiatic typhoons.—*Globus*, Bd. lvii., No. 12.

*The Times* of April 5th announced the signing of a convention, **opening Chungking**, on the Yang-tse-kiang, to foreign trade. Mr. Little's enterprising endeavours to navigate this river and the obstacles thrown in his way have been recorded in the *Scottish Geographical Magazine*, vol. v., p. 47, and vol. vi., p. 161.

The *Compte Rendu*, No. 5, 1890, of the Paris Geographical Society announces that **Mwanga has recovered Uganda** after defeating his rival, Karema. It is said that the news of the approach of a caravan of Europeans—probably the one sent out by the British East Africa Company under Jackson—turned the scale in his favour. The death is announced of **Mr. Mackay**, the missionary.

At a late meeting of the Stockton-on-Tees Chamber of Commerce, the President drew attention to the **Teeside Salt Field**, which covers an area of 11 square miles, with salt strata of an average thickness of 70 feet, often increasing to 100 feet. Each acre of the field is calculated to supply 200,000 tons of salt, the total amount being considered equal to meet almost any demands.

Dr. Nansen has planned an expedition for the purpose of attempting to reach the **North Pole**. He proposes to enter the Arctic regions by Bering Strait, and then make for New Siberia, where he will abandon his vessel to the guidance of the current, which will, in his opinion, carry it in two years to the sea between Greenland and Spitzbergen. Dr. Nansen intends to have a ship built which will be raised up by the ice instead of being nipped by it.—*Petermann's Mitt.*, 36 Bd., No. 3.

An expedition is projected in Denmark to explore the East Coast of **Greenland** between the parallels of 66° and 73° N. lat. No European has yet landed on this coast between the parallels of 66° and 70° N. lat. The expedition is to consist of nine persons under the command of Lieut. Ryder, and is to be conveyed to the coast of Greenland in June 1891 by a steamer which will return for them after two years. The scheme is so popular in Denmark that no doubt the necessary funds, £14,000 to £16,000, will be voted by Parliament.

## NEW BOOKS.

*The Islands of the Ægean.* By the Rev. Henry Fanshawe Tozer, M.A., F.R.G.S., Fellow and Tutor of Exeter College, Oxford. With Maps. Clarendon Press, 1890. Pp. 362. *Price 8s. 6d.*

In this handy volume Mr. Tozer records his impressions of these picturesque islands, which he explored in the course of three journeys, made in 1874, 1886, and 1887, respectively. He not only entertains his readers with graphic descriptions of the present aspect and condition of the islands, but instructs them also as to their antiquities and the mythical or historical incidents which invest some of them with a romantic interest. The muse of Byron has taught us to regard them as the "Edens of the eastern wave," but they are Edens only in poetic vision. They are set no doubt in sunny seas, and over-arched with skies of loveliest blue, while at times they surprise the traveller with scenes of surpassing beauty or grandeur, but some of them are little else than bare rocks of desolate aspect, while very few of them can be said to be either fertile or well-wooded. Mr. Tozer climbed several of the island-peaks, and saw from their summits views of incomparable extent and magnificence. Thus, from a peak in Tinos he descried on one hand Mount Hymettus in Attica, and on the other the islands that fringe the shores of Asia Minor, as well as those shores themselves stretching from Ephesus onward to Smyrna. Around him lay the Cyclades, looking, as Herodotus has remarked, like the cities of Egypt when the inundations of the Nile have submerged all the land around them. Immediately under him was Delos, once adorned with the

temples of the sun-god, but now strewn with their ruins and inhabited by only one human being, an old shepherd. In his third journey he visited the northern group of islands, consisting of Thasos, Samothrace, Imbros, and Lemnos. This was perhaps the most important expedition of the three, since these islands, being difficult of access and very seldom visited, are less known than the others. He was charmed with Thasos, which he considers to be the most beautiful of all the Ægean Islands. His notices of the labyrinth of Crete, of the grotto of Antiparos, and of his visits to Patmos and Crete are peculiarly interesting. The islands have had a changeful history—free at first or ruled by native despots—then subject in turn, some or all of them, to Greece, Persia, Rome, Byzantium, Venice, Genoa, and now to Turkey, except the Cyclades, which are included in the kingdom of Greece. Their principal products for export are olive-oil and wine. As the author writes in a clear and concise style, and wastes no space over merely personal incidents or minute archæological details, his volume is brimful of information on all points that are of permanent interest and importance connected with his subject. It will prove invaluable as a guidebook to the Ægean Islands.

*Handbook to the Mediterranean, its Cities, Coasts, and Islands, for the Use of General Travellers and Yachtsmen.* By Lieut.-Col. Sir R. Lambert Playfair, K.C.M.G. Third Edition, in two parts. London : John Murray, 1890. Price 21*s.*

The name of Murray attached to a guidebook is usually a sufficient guarantee of its worth, and the one before us is fully up to the standard. Each part is a handy volume complete in itself, with index, etc. The size is convenient for the pocket. The printing is remarkably clear ; and the eighty-one maps and plans seem carefully drawn. The descriptions of towns, etc., are not confined to those on the actual coast, but embody important inland cities, such as Granada and Jerusalem. The handbook will be of great use to yachtsmen, describing as it does harbours, anchorages, reefs, shoals, and lighthouses along the entire coast of the great inland sea. There is a slip at page 353, where Pisa is said to be built on both banks of the *Lung'* Arno.

*Impressions of Russia.* By Dr. Georg Brandes. Translated from the Danish by Samuel C. Eastman. London : Walter Scott, n.d. Pp. 353. *Price*, 2*s* 6*d.*

Mr. Walter Scott has an observant eye for what is valuable amongst Continental literature. It was a happy idea to complete the translation of Tolstoi's novels and didactic works by adding to them this book by one of the keenest of living literary critics. Dr. Brandes' reputation is European, and the admirable qualities displayed in his criticism fully justify it. *Impressions of Russia*, though a very readable book, and though distinguished by the acute and discerning judgment that characterise its author, is not geographical, except to the very slightest extent. The first half treats chiefly of the national characteristics of the Russian people and their culture, or, rather, lack of it ; the second half is expressly devoted to the great modern writers of the country. The translator, an American, has done his work, we may add, in fairly idiomatic English.

*Un Viaggio a Nias.* Di Elio Modigliano. Illustrato da 195 incisioni, 26 tavole tirate a parte, e 4 carte geografiche. Milano : Fratelli Treves. Pp. xiv + 726. *Price*, 10 lire.

The work before us is not merely a valuable monograph on a small but by no means uninteresting island ; it is also an important addition to our knowledge of various interesting features connected with the Malayan archipelago. Signor

Modigliano is not, indeed, the first scientific traveller whose researches have led him to Nias; we need only mention among his predecessors the late C. B. H. von Rosenberg, whose recent death is a great loss to Malayan geography. Various other Dutch travellers and officials have visited the island, and there is a somewhat melancholy reminiscence for Englishmen in the fact that it was the scene of some of the earlier labours, too soon interrupted, of Sir Stamford Raffles.

From the position of the island, and the character of its inhabitants, it was long the scene of a good deal of piracy and slave-trade, the Achinese being particularly active in these respects, and till latterly more than a match for the Dutch authorities in Sumatra. The Dutch, in fact, for a long time seem to have tried rather to regulate than to suppress slavery in those parts, and, although now contrary to law, a certain amount of this traffic is still apparently carried on by Malay and Chinese traders. The Dutch are far from popular in Nias, and until five years ago all their attempts at settlement in the island were ineffectual; and Signor Modigliano, in his attempts at exploration, found it advisable to explain that he was in no way connected with them. Considering the difficulties he met with in the uncertain disposition of the natives, and from the fact that the Malay language is not spoken there, the results of his journey, not only in collections and drawings, but in notices of the customs and traditions of the people, are remarkably copious and important. The people seem to be of a race allied to the Bataks, with no doubt, from their situation, a certain subsequent mixture of a Malay, and probably of a Bugis element, to which last, however, the author seems disposed to attribute an Indian origin. Head-hunting is rife among them, being practised not from mere wantonness, but as an adjunct to most of the ordinary social observances. Their artistic powers, as shown by the numerous and excellent illustrations with which this work is furnished, are considerable, though this does not appear in the sculpture of their idols, which are of a conventional archaic type. In agriculture they are singularly backward, and are ignorant even of irrigation, or else too lazy to practise it.

Botanists will remember the description given by Beccari in his *Malesia*, of the *Myrmecodia*, an order of parasitic plants with large tubers, which are inhabited by colonies of ants. Signor Modigliano gives some further particulars on the subject; and he deals at length with various other matters, as language, beliefs, and customs, which, as well as his own personal adventures, are full of interest.

*Algeria and Tunis: Handbook for Travellers.* By Sir R. Lambert Playfair, K.C.M.G. Fourth edition, thoroughly revised. With Maps and Plans. London: John Murray, 1890. *Price* 10*s.*

The publishers of this admirable Handbook, which is already favourably known, could have secured no more competent writer than the British Consul-General for Algeria and Tunis. The present edition has been thoroughly revised. In consequence of the rapid extension of the railways in Algeria, and the completion of the line from Algiers to Tunis, the fresh facilities for the travelling public in the French colony and protectorate have rendered the former edition of *Murray's Guide* out of date. Other lines have been completed: (1) to Biskra, an important winter station, now within twelve hours of the sea, (2) to Tebessa, (3) to Bougie, (4) from Mostaganem to Tiaret, whilst (5) the line to Tlemçen is nearly finished.

The Handbook is admirably arranged, and written in a scholarly style. The introductory information, dealing with the geography, history, etc., of the countries, is admirably compiled, and is in itself valuable as a medium of reference. The only objections we have to the Handbook are: (1) that the French spelling of place-names has been retained throughout (such as Chott for Shott, Djebel for Jebel, Oued for Wad, etc.), and (2) that the maps are slight.

*Reise durch das Kongogebiet.* Von R. Büttner. Dritte Auflage. Leipzig: Hinrichs'sche Buchhandlung, 1890. Pp. 283.

This is a third edition of Dr. Richard Büttner's book. The author's journeys in the country between the Congo and the Kwango, a tributary of the Kasaï, are wel known. He accompanied, as naturalist, the German African Association's Expedition of 1884, of which Schulze, Kund, Tappenbeck, and Wolf were also members. Dr. Büttner's volume deals with general results rather than with specific geographical *data*, which have already been published elsewhere, and it presents a very readable account of the expedition.

*Calabar and its Mission.* By Hugh Goldie, Missionary at Old Calabar. Edinburgh: Oliphant, Anderson, and Ferrier, 1890. Pp. 328. Map and Illustrations. *Price 5s.*

Mr. Goldie has had some fifty years' experience as a missionary, and has seen the foundation, growth, and expansion of the Calabar mission. Dealing with a part of Africa which is little known, but is now included within the British Niger Protectorate, his book gives useful information, not only in regard to the progress of missionary enterprise, but also respecting the country itself, and the people, their language, government, social organisation, etc. In the main it is historical, but the visits of the missionaries to neighbouring tribes introduce some slight geographical *data*. Mr. Goldie's researches in the Efik language, which belongs to the Negro Family, are known to be of value. The book is furnished with a clear map and a few illustrations, and can be confidently recommended to the student of African geography.

*Stanley and his Heroic Relief of Emin Pasha.* By E. P. Scott. Illustrated. London: Dean and Son. Pp. 264.

An account of Stanley's travels in Africa, to which extracts from Stanley's letters to the Emin Relief Committee are appended. As these letters have been published over and over again, and the introductory matter and comments are too slight to be of any value, it is not difficult to see the object which the author had in view in publishing this book. It is a manufactured book of the most pronounced kind. There are several misprints.

*Two Summers in Greenland.* By A. Riis Carstensen. Illustrations by the Author. London: Chapman and Hall, 1890. Pp. 185.

Although Greenland has been for long the field of Danish scientific and missionary enterprise, whilst information in regard to the West Coast settlements and the ice-conditions on the coasts generally has not been lacking, it is not often one gets readable accounts of Greenland as a new country for the tourist. Mr. Carstensen, with "pen and pencil," has given us a very pleasing and picturesque view of his subject. Though slight in construction and limited in range, his book conveys a good deal of general information, and the oil-paintings which he made of the scenery have been admirably reproduced by some art process. The general reader, who desires only a superficial knowledge of Greenland, will nowhere be better able to attain it than in Mr. Carstensen's volume. The book is marred by want of a more thorough revision, and is provided with only a wretched autograph map; both are blemishes for which there can be no excuse.

*Among the Selkirk Glaciers, being the account of a rough survey in the Rocky Mountain Regions of British Columbia.* By W. Spottiswood Green, M.A. F.R.G.S., A.C. With Map and Illustrations. London: Macmillan and Co., 1890. Pp. 251.

The author travelled by the Canadian Pacific Railway to Glacier House Station,

which stands 4122 feet above sea-level. "The mountains in the vicinity of Glacier House are clothed in primeval forest, and several lofty peaks rise to the height of eight and ten thousand feet. Dark green forest, rushing streams, purple peaks, silvery ice, a cloudless sky, and a most transparent atmosphere, all combine to form a perfect Alpine paradise." From his headquarters at Glacier House Mr. Green made excursions, exploring and surveying the neighbourhood. He relates some thrilling experiences among the glaciers and ice-crags of that little-known region. From beginning to end the book is very interesting, and will repay perusal by all who love the excitement of Alpine climbing. We note a misprint in the list of illustrations. The second view should have been stated to face page 247 instead of 38.

*Mountaineering in Colorado: The Peaks about Estes Park.* By FREDERICK H. CHAPIN. With eleven Plates and forty-one other Illustrations. Boston: Appalachian Mountain Club, 1889. Pp. xi, 168. *Price*, $2.00.

This is the record of ascents made in 1887 and 1888 from Estes Park, a ranching district near the Wyoming boundary-line, and about seventy miles north-west of Denver. Some of the peaks climbed, such as Long's, rise to beyond 14,000 feet, and all are of a respectable height; but, unlike some of the Swiss peaks, the high crests of the Rocky Mountains would seem to have always some easy way of access, and even where one face is absolutely inaccessible, the others generally present no really hard climbing. The fact that Mr. Chapin carried his camera to the highest summits he reached is some proof of this. Nearly all the illustrations are from photographs taken by him in his various expeditions, and, although unequal in merit, on them depends much of the interest of the book. Eleven are full-page heliotype plates, including two coloured plates of the Hallett glacier, in which, by the way, the ice is represented as green. The most interesting photograph obtained, however, is that of three Rocky Mountain sheep from within about a hundred feet. This is probably unique, and, considering the great shyness of the famous "big-horns," Mr. Chapin must be congratulated on his good luck. He has added in one or two instances to the nomenclature of the range, though only where it seemed necessary. His book is primarily of interest to mountaineers, but it also contains some fresh information about this part of the Colorado Rockies. An appendix contains a catalogue of the flora of Estes Park.

*The Handbook of British Honduras for 1889-90*, comprising Historical, Statistical, and General Information concerning the Colony, compiled from Official and other reliable Records. By LINDSAY W. BRISTOWE and PHILIP B. WRIGHT. Edinburgh and London: Wm. Blackwood and Sons, 1889. Pp. 256. *Price* 6*s*.

This excellent handbook, which now appears in a second edition, has been compiled with great labour and care from official and other records, on which full reliance may be placed. Intending settlers and others interested in the progress of the colony will find in its pages all the information about its affairs they are likely to require. The work is divided into seventeen parts, of which the third, fourth, and thirteenth will be found most generally interesting, as they contain a description of the natural features and productions of the colony, together with a sketch of its history and of its political constitution. British Honduras lies between the parallels of 15° 54′ and 18° 29′ of north latitude, and has an average breadth of about 45 miles. Its northern portion may be described as a dead flat traversed by sluggish streams, whilst the southern portion is diversified with plateaux and hill ranges of moderate elevation. The principal range, beginning a little to the south of Belize, runs southward in a line parallel with the coast. Its slopes and

summits are clothed with the rich verdure distinctive of Tropical countries. Other ranges stretch westward from this coast range, and rise in conical peaks which proclaim their volcanic origin. The highest is the Victoria Peak, in the Cockscomb Mountains, which attains an elevation of 3700 feet. The country to the south of the Belize River, comprising fully one half of the colony, has been as yet only very imperfectly explored. The western portion is an open undulating country with magnificent pasture lands. It is uninhabited, but old ruins have been discovered, which show that it must have been formerly occupied by Indian tribes. Towards the coast it is all forest full of valuable timber.

Belize, the capital, situated at the mouth of the river of the same name, and in the neighbourhood of swamps, is one of the brightest, cleanest, and healthiest towns of the West Indies. It had, like Rome, a somewhat ignoble origin, having, it is said, been founded by buccaneers, who abandoned piracy for logwood-cutting when Charles I. had concluded peace with Spain. The first regular establishment, however, of logwood cutters was not made till 1662, when some English adventurers came over from Jamaica to Belize. The colony was ruled from that island till October 1884, when it received a governor of its own. The whole population is estimated at 30,000, and of these only from four to five hundred are Europeans. In 1887 the estimated acreage of its cultivated lands was 44,601, and of land uncultivated 4,153,399 acres. The largest area under cultivation is that which is occupied by Indian corn or maize, which is the staple food of the Indian and Spanish populations. A great variety of the finest fruits and vegetables are produced for export, chiefly to the United States. The principal exports to the mother-country are logwood and mahogany, to the value of £109,500 and £36,000 respectively. The climate seems to be one of the finest within the Tropics, and the temperature is equable throughout the greater part of the year. There is an absence of rain for three or four months from the end of January, the annual rainfall being between 40 and 50 inches. The cold north winds of the winter months are dry and bracing, and, when the Trade-winds prevail, the whole coast is unexceptionably healthy.

*A Naturalist among the Head-hunters.* By Charles Morris Woodford. With Maps and Illustrations. London: G. Philip and Son. Pp. 249. *Price* 8*s.* 6*d.*

Since the acquisition by Great Britain of territory in New Guinea, public attention has been directed to the numerous groups of islands lying in the Pacific to the east and south of that country. Many of these islands have from time to time been brought into notice by the reports of missionaries and other travellers, or the occurrence of some massacre of a shipwrecked crew, or plunder of a trading vessel. The Solomon Islands, the scene of Mr. Woodford's adventures, have always enjoyed an unenviable notoriety on account of the ferocity of the natives and their hostility to strangers. Mr. Woodford paid three visits to the islands, in 1886-7-8, and seems to have lived on quite friendly terms with the inhabitants. He, however, took the precaution to put himself under the protection of one of the chiefs, and, as he says, he never had cause to regret the confidence he placed in him. The author is an enthusiastic naturalist, and it was in pursuit of his favourite science that he was induced to risk a residence among the head-hunters of the Solomons. His descriptions of the vegetation and the new and varied forms of bird and insect life are very interesting. He gives some startling stories of head-hunting, and more than enough of evidence to convince one of the prevalence of cannibalism. The whole narrative of the author's life and occupation during his residence on the islands is most entertaining, and is a valuable contribution to our knowledge of that group. The book is illustrated with some capital reproductions

from photographs. A vocabulary of five of the native languages is given, as well as some remarks on the probable migration of the Polynesian race.

*The Jenolan Caves*: an Excursion in Australian Wonderland. By Samuel Cook. Illustrated with 24 Plates and Map. London: Eyre and Spottiswoode, 1889. Pp. 190. *Price* 6*s.*

The Jenolan Caves are situated in New South Wales, beyond the Blue Mountains, west of Sydney. They are reached by rail as far as Torana, 120 miles from the capital, and by driving 35 miles from Torana. They were discovered less than fifty years ago, in 1841 only. In 1866, the caves, together with six and a half square miles of land in the immediate vicinity, were set apart by the Government of the colony as public property. Mr. Cook's handsome book is well calculated to whet the reader's curiosity, and make him long to see with his own eyes the marvels described. But we question whether the beautifully engraved small quarto plates, from photographs of the most picturesque caverns in the system, do not give a far more graphic idea of what the Jenolan Caves possess in the way of wonderful scenery, than all the resources of Mr. Cook's graphic pen. To give a suggestion of their magnitude and the scale of their grandeur and beauty, they can only be compared with the well-known Mammoth Caves of Kentucky. Like these last, the Jenolan Caves have subterranean rivers, caverns that have suggested the most romantic nomenclature, arches, halls, columns, bowers, cities, grottoes, caskets, palaces—all in limestone, fantastic, bewildering. The book is not a guidebook, but an historical and descriptive account of the caves, first published in the pages of the *Sydney Morning Herald*.

*Bible Illustrations from the New Hebrides.* By the Rev. John Inglis, D.D., F.R.S.G.S. Thomas Nelson and Sons, 1890.

The venerable author of the work *In the New Hebrides* has in this volume made a valuable contribution to our knowledge of the department of geographical inquiry which is concerned with man and animal life. Especially important are the Chapters xvi. to xxiv. on the mode of treating natives, on the natural history of Aneityum, on courtship and marriage customs, on diseases, on civil government, on foreigners, and on the French attempts to annex the New Hebrides. The whole forms a most readable and suggestive account of the ethnology of an island which has, in a few years, been entirely Christianised by Scottish missionaries of the high type of Dr. Inglis.

*Oceania: Linguistic and Anthropological.* By the Rev. D. Macdonald, Havannah Harbour, New Hebrides. Melbourne: Hutchinson. London: Sampson Low. Pp. xii, 218.

The author's object is to prove a relationship between the Oceanic languages and the Semitic, and his speculations on the subject, as well as on the origin of the races in question, if not in accordance with the principal authorities on the subject, are at all events ingenious.

*Meyers Konversations-Lexikon.*—Vierte, gänzlich umgearbeitete Auflage. Bände xiv.-xvi.: Rüböl—Zz. Leipzig: Verlag des Bibliographischen Instituts, 1889-90.

The editors of *Meyer's Konversations-Lexikon* have at length brought to completion the great task they set themselves in 1885, the issue of a new and thoroughly revised edition of this excellent encyclopædia. Vol. xvi. concludes the alphabet. We can honestly say that we are glad to learn the undertaking has been a success.

We understand the issue has reached the high figure of 140,000; some of the earlier volumes had even a larger sale. The profits are stated to amount to $12\frac{1}{2}$ million marks (=£625,000); and the statement, whether true or not, is not altogether unworthy of credence, because some two and a quarter million volumes are said to have been sold, at the price of ten marks each. Taken all in all, this is one of the best encyclopædias in the market; it is certainly the cheapest, considering its bulk and quality. And we do not hesitate to say that it must be regarded as part of the indispensable equipment of every efficient library, public or private.

Turning to the last three volumes, we have not of course read all that they contain, not even all the geographical articles; but we have tested their armour at such points as experience has taught us faults and defects are likely to exist. And we are pleased to be able to say that of such faults and defects we have discovered, comparatively speaking, few. The most important articles from the geographer's standpoint that these volumes contain are—Hungary (Ungarn), Spain, Russia, Turkey, Sweden, Switzerland, Sicily, Tibet, Zanzibar, Central Asia (Zentral-Asien), West Indies, West Australia, Victoria, South Australia, and the United States (Vereinigte-Staaten). In the last-named article, we note that the newly constituted States, North and South Dakota, for instance, are correctly delineated on the map, Yankton being marked as the capital of South Dakota. In the text it is stated that amongst the terrritories elevated to the rank of States in 1889 is New Mexico. But New Mexico still remains a territory, having failed to satisfy the constitutional conditions which entitle a territory to admission to the rank of State. And why is Washington in that article still called a territory, although it is expressly stated at the foot of the page that it was created a State in 1889? By the way, we have noticed one or two misprints on the town-plan of New York, as cemetery of *he* Evergreens, Fres*k* for Fresh Pond, etc. Under Yucatan we looked in vain for a statement of the great commercial importance of sisal hemp or henequen, which is for that country what its gold is for the Transvaal, or its fisheries for Norway. The information under the several Australian colonies is in every instance brought up to date, a fact that reflects credit not only upon the watchfulness of the writers, but also upon the promptitude of public spirit displayed by the statistical bureaus of the colonies. It may not be amiss to point out that there are maps of the Panama and Nicaragua Canals printed on the back of the map of the West Indies, where they might easily be overlooked. There is a useful map of Central Asia, supplementing one under Russia, which shows the rate at which the territory of this power grows in Asia, and its exact position a year or so ago. The African articles are pretty full on the whole, especially Zanzibar (Sansibar), the map of which shows the German East African possessions. But under Uganda there is nothing said about the history of the country since 1885. Stellaland and Goshen, the two mushroom Boer republics, are to be found under such an unusual heading as *Westbetschuanen*, *i.e.* West Bechuana. Surely nobody would dream of looking for them there. We do not observe any article on Swaziland, although it is mentioned as one of the territories bounding the Transvaal (*Südafrikanische Republik*). Under "Universities," the account of the universities of Ireland is far from being satisfactory. Three only are enumerated, the University of Dublin (Trinity College), Queen's University (1849), and the Roman Catholic University. Now Queen's University, which included the colleges of Belfast, Galway, and Cork, was superseded in 1882 by the Royal University of Ireland. An examining body like London University, it has no connection with the three colleges mentioned. Then again, a college at Londonderry and another at Belfast have been constituted the Presbyterian Theological University

since 1881 ; of this there is not a word in Meyer. These adverse criticisms all relate, it will be observed, to points of detail ; they can hardly be considered to modify the general verdict upon the whole work, that it is a marvel of full and accurate information, brought down to the latest dates, and presented in a wonderfully lucid and yet succinct style. If you only know where to look for it, it is safe to say you will find in this encyclopædia almost any information you desire, and nearly always as much as you desire. The publishers announce a seventeenth volume to complete the work ; it will consist of supplementary articles, of new articles that have been rendered necessary by the march of events (as for instance Oklahoma, the new territory in the United States), and a complete index to the entire work. Besides this, an annual supplementary volume is promised, which will keep picking up the threads of new events as fast as they occur.

*Curious Creatures in Zoology*, with 130 Illustrations. By JOHN ASHTON. London : John C. Nimmo, 1890. Pp. 334.

Mr. Ashton has selected the title of his book on the *lucus a non lucendo* principle. His "Curious Creatures" are utterly disowned by modern Zoology and Geography. They are the subjects of the "fairy tales" which these sciences taught and believed, or pretended to believe, in the days when faith went before investigation. Herodotus and Pliny, Sir John Maundeville and Olaus Magnus are among the chief contributors to Mr. Ashton's collection of monstrosities and gorgons, hydras and chimeras dire, gryphons, rocs, and basilisks, while the more familiar or more modern races of giants and pigmies, krakens and were-wolves lie in wait for us in every page. With the whole range of ancient and medieval literature to roam over, there is no difficulty in filling such a museum of curiosities. The trouble is that of selecting examples, and Mr. Ashton has been fairly successful in finding and arranging quaint specimens of ancient or medieval fancy or credulity, in the form of bird, beast, and fish, or of creatures that defy all modern classification. The geography is of a piece with the natural history, and both have a value, apart from their interest as specimens of folk-lore and fable, as illustrating the proneness of the human mind to people the twilight region beyond the limits of its actual knowledge with all kinds of uncouth and monstrous shapes. There are still regions of geography and of zoology in twilight or darkness, and the "sea-serpent" and the "open Polar sea" have not yet been thoroughly routed into the land of fable, while the Mountains of the Moon and the Pigmies threaten to return from thence and take their places again in the map and the manual of anthropology. The illustrations of Mr. Ashton's book—reproductions of cuts from the works of Androvandus, Gesner, Sluper, Olaus Magnus, Topsell, and their congeners,—are even more quaint and curious than the text.

*School Geography.* By JAMES CLYDE, M.A., LL.D., etc. Twenty-fourth edition. Revised throughout. Edinburgh : Oliver and Boyd, 1890.

We have pleasure in calling attention to the issue of a new edition—the twenty-fourth—of Dr. Clyde's excellent *School Geography*. The book has evidently been carefully revised, and has been brought up to date at most points. We note, however, that Zululand is described as "a Crown Colony" on page 426, while at page 148 it is omitted from the list of British possessions on the ground that the British Government only "exercises a protectorate" over it. "Australasia" and "Polynesia" have been promoted to an independent position in the table of contents.

*Topics in Geography.* By W. F. Nichols, A.M. Boston: D. C. Heath and Co., 1889. Pp. 176. *Price* 50 *cents.*

A series of outline lessons in Geography classed in eight grades. The idea is good, and is on the whole fairly well carried out. Some topics are very defective, and presented in almost incredible disorder, *e.g.* in a *résumé* of the features of Europe —"f. *Islands*—Iceland, British Isles, Candia, Cyprus, Nova Zembla, Sardinia, Corsica, Balearic, Hebrides."

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## NEW MAPS.

### EUROPE.

**ENGLAND AND WALES,** New Tourists' and Cyclists' Map of ——. Specially prepared for Tourists and Cyclists. By John Bartholomew, F.R.G.S. Scale, 10 miles to an inch. Complete in 4 sections. Price 1s. each, coloured and mounted in cloth case. *London: W. H. Smith and Sons,* 186 *Strand.*

**ISTHMOS VON KORINTH,**

Karte des ——. Entworfen von Dr. A. Philippson. Massstab, 1 : 50,000.
Nebenkarten: Skizze der Verkehrswege im Alterthum. Massstab, 1 : 600,000.
Uebersichtskarte der Verwerfungen auf dem Isthmos. Massstab, 1 : 300,000.
*Zeitschrift der Gesellschaft für Erdkunde zu Berlin, No.* 145, *Tafel* 1.

**PELOPONNES,** Ethnographische Karte des ——. Entworfen von Dr. A. Philippsons. Massstab, 1 : 1,000,000.
*Petermann's Geographische Mitteilungen, Jahrgang* 1890, *Tafel* 3.
*Gotha: Justus Perthes.*

### ASIA.

**BAHREIN ISLANDS,** The ——. Reduced from the Admiralty Charts, illustrating the Journey of Theodore Bent. Scale 1 : 380,000.
*Proceedings of the Royal Geographical Society, January* 1890.

**PEKING TO KASHGARIA,** Map to illustrate Paper by Colonel Mark S. Bell, R.E., V.C., on the Great Central Asian Trade Route from ——. Scale. 1 : 8,900,000. *Proceedings of the Royal Geographical Society, February* 1890.

**SOTLEDSCH,** Karte des oberen ——, nach einer Kartenskizze von Missionar Weber in Pu. Massstab, 1 : 685,000.
*Deutsche Rundschau für Geographie und Statistik, Jahrgang* 12, *Heft* 3.
*Wien: A. Hartlebens Verlag.*

**ADRAMYTI,** Umgegend von ——, im nordwestlichen Kleinasien. Entwurf nach Routen und Winkelmessungen von H. Kiepert und E. Fabricius, 1888. Geologische Angaben vom Berg-Ingenieur Kunze.
*Zeitschrift der Gesellschaft für Erdkunde zu Berlin, No.* 143, *Tafel* 5.

### NORTH AMERICA.

**BANCS DE TERRE NEUVE,** Cartes Bathymétriques et Géologiques des ——, d'après les Cartes de la Marine française. Par J. Thoulet.
*Bulletin de la Société de Géographie,* 2*me. Trimestre,* 1889.

**COUNTY HALIFAX.** Surveyed and drawn by E. Hopkins, Sergeant R.E. Scale, 1½ inches to 1 mile. *Intelligence Division, War Office, No.* 764.

**UNITED STATES**, Geological Survey of the ——. J. Powel, Director. Scale, 1 : 62,500.

RHODE ISLAND : Block Island, Charlestown.
GEORGIA—ALABAMA : Tallapoosa.
VIRGINIA—NORTH CAROLINA : Wytheville.
VIRGINIA—WEST VIRGINIA : Lewisburg.
VIRGINIA : Buckingham, Harrisonburg, Spottsylvania.
MASSACHUSETTS : Wellfleet, Provincetown, Muskeget, Nantucket, Webster, Martha's Vineyard, Yarmouth, Plymouth.
MASSACHUSETTS — CONNECTICUT : Springfield.
TEXAS : Granbury.
NEW MEXICO : Albuquerque.
KANSAS : Wichita, Newtown, Abilene.
MASSACHUSETTS — NEW HAMPSHIRE : Groton.
WISCONSIN : Evansville.
IOWA : Shellsburg.
MASSACHUSETTS, Map of. J. Powel, Director. Scale, 1 : 250,000.

## SOUTH AMERICA.

**MAPA ET BAS ARAGUARY**, Levés à la boussole par H. A. Coudreau. Echelle, 1 : 550,000 ; Région au Nord de Mapa, 1 : 100,000 ; Lago Novo, 1 : 500,000.
*Bulletin de la Société de Géographie, 3me. Trimestre*, 1889.

## OCEANIA.

**AUSTRALIA**, Lindsay's Route across ——, between the Queensland Boundary and the Overland Telegraph. Scale, 1 : 2,300,000.
*Proceedings of the Royal Geographical Society, November* 1889.

**PART OF SOUTH-EAST NEW GUINEA**, Map of ——. Embracing its Northern and Southern Waters. Compiled from Surveys and Explorations made by the Government of British New Guinea, from the Admiralty Charts, and from the Explorations of Messrs. H. O. Forbes, F.R.G.S., and W. R. Cuthbertson. Scale, 1 : 285,000. *Printed and published at Surveyor-General's Office, Brisbane*, 1889.

## NORTH POLAR REGIONS.

**THE ARCTIC SEA**, Wrangel Island to Mackenzie River. Showing the Northern Limit of the Southern Edges of the Ice-Pack in the years 1879-85-86-87-88 and 89.
*U.S. Hydrographic Office, Washington*, 1890.

**KONG KARL'S LAND**, Kart over —— efter Hemming Andreasens Jagttagelser i 1889. Ved Karl Pettersen. *Ymer* 1889, *No.* 4.

**ISLAND**, De varme Kilder paa Hveravellir i ——. Opmaalte 1888 af Th. Thoroddsen. *Ymer* 1889, *No.* 3.

## GENERAL.

1. Linien gleicher Wärmeanomalie des Januar (Thermische Isanomalen). Von R. Spitaler.

2. Linien gleicher Wärmeanomalie des Juli (Thermische Isanomalen). Von R. Spitaler.

*Petermann's Geographische Mittteilungen, Jahrgang* 1889, *Tafel* 17 *und* 18. *Gotha : Justus Perthes.*

Karte der Verbreitung jetzt lebender Cerviden. Entworfen und zusammengestellt von Karl Grevé in Moskau.

*Deutsche Rundschau für Geographie und Statistik, Jahrgang* 12, *Heft* 2. *Wien : A. Hartlebens Verlag.*

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# THE SCOTTISH GEOGRAPHICAL MAGAZINE.

## GEOGRAPHICAL NOTES ON THE COUNTRY BETWEEN LAKES NYASSA, RUKWA, AND TANGANYIKA.

*(With a Map.)*

By the Rev. D. Kerr Cross, M.B., C.M.

Having been situated as missionary of the Free Church of Scotland on the hill country between the three lakes, Nyassa, Tanganyika, and Rukwa, I have been led to take some interest in the geography of the country. Not having been trained in this department I am fully aware that any observations I may offer are imperfect, and not to be relied upon, but being urged to give what I had I have yielded, and only hope that they may help me and others to take a deepened interest in the country referred to.

To facilitate matters I will divide the country into three districts, and of these will speak separately:—1. The country to the north of Lake Nyassa embracing the country of the Awanyakyusa, the Awakukwe, the Awabundali, and Awamesuko tribes; 2. The first part of the Nyassa-Tanganyika plateau, embracing the country of the Awawandia, Utambo, and Uwurambia tribes; 3. Notes on a journey through the Mpoko, Unyika, and Miwungu countries, and on to the little-known Lake Rukwa.

I have been privileged to visit the country lying to the NW. of Lake Nyassa on several occasions, and have resided on the hills for many months, where, with the late Rev. Mr. Bain, we built a house and began mission work. The country of the Awanyakyusa or, as they sometimes call themselves, the Awamasoko, is, perhaps, one of the richest countries of Nyassaland. It is a large plain, skirting the lake from the Livingstone range of mountains to Karonga, and may vary from fifteen to twenty miles in breadth. At present it is occupied by three chiefs: 1. Mwankenja, who occupies the country N. and NE. of the lake up to the slopes of the Awakinga country or the Livingstone range of mountains;

2. Mwamakula, or Mwanjewara, on the M'baka river; 3. Mwakatunda or Mwakyusa, on the Kiwirwa. The country itself is flat and somewhat marshy, and doubtless at one time was covered by the lake. It is remarkably rich, and is well watered, both by rains and by the rivers which run through it to the lake. Two, or perhaps three, crops can easily be raised in the year. Many of its plains are for months under water, but the higher parts are occupied by the natives, and are covered by banana plantations. These plantations are the delight of the people, and are usually planted along the higher ridges of land, and in long lines. You may walk for six or seven hours in a straight path and pass from village to village and never be outside the cool shade of the bananas. The country abounds in cattle, in which the black man's wealth lies. These herds are tended with the greatest of care, and either housed in separate houses, or one-half of the owner's round house is given to the cow. To look across the plain and see two or three herds of cattle browsing, and, in the still sultry afternoon, to hear the rude tinkle of iron bells (for each cow has a bell) is very pleasing indeed.

Sometimes, I am told, these cattle browse with the buffalo, which here roam about in great herds. In January '88 I was one of a large caravan which saw an immense herd of buffalo in Mwakatunda's country. One of our number went off to hunt, and alarmed the herd, which came rushing across the plain to where we stood, and, running between us and the hills, went thundering past in a semicircle within easy rifle range. The very ground seemed to tremble under their heavy tread. No part of Nyassa is so well watered as this plain. To begin at the Livingstone range of mountains there are the following rivers:[1]—

1. The Lufira runs near to the foot of the Livingstone range of mountains, and sometimes requires to be crossed in canoes. It is not long, and comes from the hills to the north.

2. The M'baka, a large stream about 18 yards across, which, coming from the hills directly north in little streams, meanders through the rich flats as a sluggish water. At times its banks are high and reedy. South of its mouth a few miles is seen a sort of lagoon or inlet into a marsh called M'bashi. The natives call it Yo M'bashi, meaning The M'bashi. It looks like a river, and years ago was navigated for several miles by the little steamer "Ilala."

3. A few miles south of the M'baka a large river, the Kiwirwa, enters the lake. It rises at the north of the Livingstone range of mountains, behind a large peak called Rungwe. Rising behind this peak, it describes a half-circle through deep rocky gorges, across which the natives have thrown bridges, and then passes at the foot of the western hills called Bundale. Here it is joined by a large stream, the Suwissi, and by other lesser streams. This Suwissi rises to the west of the parent stream, and comes from the Bundali country, where, coming down the mountains, it has several very striking waterfalls, which are seen for many miles across the country as white spots on the mountain side.

4. Still further south the river Nsessi enters the lake. It is a

[1] Eight in all.

sluggish river covered with reeds and grass, and has an impassable bar at its mouth. It comes from the hills to the NW.

5. A mile south the Songwe has its mouth. It too has a bar, which the natives at certain seasons can wade. This is the longest of the northern rivers, and may be from eighty to a hundred miles in length. It rises on the sides of the Busango hills, or, as Mr. Thomson calls them, the Munboya mountains, in the Unyika country. As it flows past Mwenechinga's village it is a stream 20 yards or so wide, with well-wooded banks. From this for 20 miles in its course it rolls in cascades through Masuko's country and on to the lake. The first half of its course from the lake will be nearly west by a little north. At Chinga it takes a more northern course and goes decidedly NW.

6. Two miles below the Songwe is a small river, the Kaporu; while, below it a few miles,

7. The Rufira enters the lake at N'gerenge. This river as it comes through the hills at times acquires great velocity, and comes down in mountain torrents, but, as seen crossing the plains near the lake, is a gentle, though broad, stream. Here it cuts for itself deep channels in the sands every year.

8. Nearly directly south of this last, a few miles, is the Rukuru, which enters the lake at the Kambwe lagoon. At times this is a great river, and like many of the other rivers has several mouths. Remains of old channels are seen for miles around.

As all of these rivers come from the hilly country to the west and north, where in certain parts (as in Ukukwe and Bundali) hardly a month passes without a shower, and the rainfall during the wet season is very great, they are subject to serious inundations. At these times the rivers overflow their banks, and flood the plains, and bear to the lake great bodies of water and much *débris*.

Over and over again have I been struck with the beauty of the villages occupied by the Awanyakyusa. Landing on the sandy beach, you enter a grove of banana trees and walk along a perfectly level plain as in a palm section of a botanical garden. All weeds, grasses, garbage, and things unsightly are swept away by little boys who spend their morning sweeping, while, hidden away among the trees, are the circular houses of the natives. Each house is built of bamboo, with clay worked by the women into little rounded bricks. The roof is of thatch, which greatly overlaps in mushroom form, while the door is so large that a man can walk in upright. The door-posts are often painted with designs in red, yellow, and other colours, and altogether there is an air of comfort and plenty. These are the houses of the married people. Unmarried men live in long-shaped houses often twenty paces in length, called *ákiwaggà*, and built of bamboos intertwined with reeds. Their cattle-houses are oblong, and equally prettily wrought. Herd-boys always sleep with the cattle; they on the one side and the cattle on the other. Few of the people have stools, but most sit upon mats or bamboo leaves cut down from the nearest tree. Dotted here and there in these banana groves are an immense number of great shady trees called *misyungute*, which are somewhat like our sycamore. Under the cool shades of these

trees, in the sultry noon, fires are lit, in the smoke of which the cattle stand and chew the cud unmolested by flies. Food is everywhere abundant—bananas, sweet potatoes, cassava, yams, Indian corn, beans, peas, millet and other seeds, wild fruits, honey, milk, and beef. I have been able to collect over twenty different species of bananas and plantains, all named by the natives and put to different uses. This tree furnishes the native with paper and twine; from the leaves he makes mats and blankets; from the fruit he makes flour, bread, and wine. Nor is this character of cleanliness visible in their villages confined to the outside. All their cooking-pots and drinking-cups are kept scrupulously clean and sweet, and the insides of their houses free from dirt—a rare quality in the native African. The people themselves in every respect accord with the scene. They are all stalwart, muscular, and well-developed. Having entered a village you are accosted by a naked native, who has been lazily lying on his mat, rising bowing and saluting you with "*Isaga mzungu*" —welcome white man. Then, bowing most politely, he bids you good morning thus: "*Sawkire-sawkire-sawkire.*" Then asking if *you* have slept, and your friends have slept, he bids you rest. Soon the chief comes to pay his respects, and, as he dare not come with his hands empty, he brings an ox, a bunch of bananas, and a huge pot of thick milk or beer, on which, if you give a return present, friendship is established.[1]

The description I have just given holds good of the four sections at the north and west of Lake Nyassa, embracing the Awanyakyusa on the lake shore, the Awakukwe, the Awabundali, and the Awamesuko on the higher lands. These four names are but sections of what all who know them acknowledge to be one tribe. They call themselves by the different names I have given, but their language, their physique, their dress and peculiar intonation of speech prove them to be members of one great family, and they may be named, as their neighbours often call them, the Awamwamba, or the people at the top.

Two years ago I was one of a small party who visited this people. Landing at the M'bashi river, we were hospitably entertained by the present Mwanjewara. He is at present but a deputy ruler, and will soon be supplanted by the young chief, a youth of sixteen, named Mwaka—strength. We travelled for the greater part of two days along the bank of the M'baka river, and crossed it twice before we began to ascend the hills. Leaving the plains, we got beyond the bananas, and entered a country covered with scrubby bush and tall grass. After a gradual ascent of several hours we entered on an undulating plateau of great extent. On our right, or east side, was the Livingstone range of mountains, running north and west, while on our left, or west, was a range of

[1] There is but one thing that blights the fair picture of these villages. After all that can be said, it must be admitted that the country is marshy; stagnant pools and marshes are found all around, and these are continuously emitting their malarial effluvia which is so fatal to health. Of the higher lands this, however, cannot be said. There you have no marshes, and there, I believe, healthy spots can be found where the fairest of gardens could be planted. Looking on such a country as the plains present, one has forced on him the inquiry, Why is it that such fine-looking men and women are developed here if marshes abound? We are taught that marshy countries tend to degenerate races, and yet no more finely developed people are found in Nyassaland than those at the north end.

hills not quite so high, called Bundale. To the north and in front we saw rising up another range, the Busango hills, while behind and to the south lay the lake. This is the country of the Awakukwe which is only a section of those on the plains below. They too love bananas, but, instead of planting them in long lines, they place them on the high ridges of land. On looking over the country you recognise a village, not by the houses, for these are hidden away in the abundance of vegetation, but by the banana grove on the hill top. This plateau is cold, very rich, undulating and well watered. The soil is soft and dark, and the natives have little difficulty in taking out of it two or even three crops in the year. Tea and coffee would grow admirably. Last July I was kept back with rain, although July is the middle of the dry season. Most of the streams run into the Kiwirwa river, and those to the east run into the M'baka. The mountains to the east run north-west and south-east for nearly thirty miles, rising at the north into a peak called Rungwe. They then sweep round and join the range of mountains of Bundali running north and south, and are at the north called the Busangu hills, and are occupied by Merere, an Arab. The country of the Awakukwe is thus a triangular niche lying between the surrounding hills, and will be 30 miles long by 6 or 10 broad, and is occupied by upwards of a dozen petty chiefs. It was of these uplands that Consul Elton made the following remarks :—

"The country we have passed through is, without exception, the finest tract of Africa I have yet seen. There is nothing to equal it either in fertility or grazing land in Natal—the reputed 'garden of South Africa.' It consists of chains of elevated valleys 3000 to 5000 feet above the sea, characterised by undulating slopes and dotted over with pyramidical hills, bounded by rich mountain spurs and walled in by high ranges, the entire district being bounded to the east by the continuation of the 'Livingstone' range, barring off the warlike Makanywala and impeding communication with the coast on these lines of latitude."

He further says :—

"We have now marched . . . over forty miles through the most exceptionally favourable country for European semi-tropical cultivation I have ever seen."

It is on this plateau, at the village of Kararamuka, that the new north-end station of the Livingstonia mission has been planted. Journeying from Kararamuka's village to N'cherenji you pass over the Bundali hills in a south-western direction. The hills on this very hilly country all run due north and south, and are very high, being from 5000 to 7000 feet above the sea. One of Thomson's camps, which was further north, is put down at 8200 feet high, and he speaks of one day making "a very steep climb of nearly 4000 feet up the face of an escarpment, through a dense piece of forest." This is characteristic of the country of the Awabundali and of the Awamesuko further south. You journey for days through valleys, terraced with well-tilled gardens, thickly planted with banana groves and well-watered, but generally treeless. The flat hills and mountain sides are under cultivation, and are serrated with imperfect hedges and by pathways to the high elevations. As you climb some of these heights and look across, you cannot but be

struck at the wonderful cultivation. Their gardens look like well-ploughed fields, and are looked after with the greatest of care. While these fields are given over to gardens, the main valleys are appropriated for grazing. All day your journey is one of ascents and descents, and often through cold mist and rain. My carriers had come from the south on one occasion, and they told with great delight when they returned that they had travelled for days "high among the clouds." All day long the cattle roam on the hillsides and among the bananas, while the herd-boys play on rude flutes made of reeds, or beat on their curious little drums. Leaving Kararamuka's village you descend the steep banks of the Kiwirwa river. These are here 600 or 700 feet high, and the river in the dry season can be forded or swum, but in the wet season no native attempts to cross. Six miles over hills brings you to the Suwissi river which comes from the hills to the north and runs into the Kiwirwa. It has some fine waterfalls high up, and is usually crossed by a native bridge. Passing over the hills, you reach the village of Mwakasyuka and on to the village of Nymberi the chief. The women here are decently clad in bark cloth, but a strip of banana leaf, out of compliment to the white stranger, is the dress of the men. Curiously enough hand-shaking is practised among the hill people, or rather a hand-grasping, as they salute one another with "*Sawkire, sawkire.*" The country south of this, called Mesuko, has all the characteristics of Bundale, very hilly with deep valleys and gorges. The villages are more scattered, but all amid bananas. Some of the gorges are well wooded, but generally it is treeless. Sometimes, standing on these lofty peaks, you get a Pisgah-like view of the undulating country around. Down the valley as through a telescope you see the great plain of the country of the Awanyakyusa, while beyond, at a distance of 40 or more miles, you see the water of the Nyassa. On either side rise smooth grassy peaks occupied by villages and gardens.

Leaving the Bundali country, you climb a neck of land, or rather a pass, in the mountains, and descend into a long valley that leads to the oft described plateau between Nyassa and Tanganyika. As you climb the pass, you are made to wonder at the admirable way nature has helped the people in the defence of their native valleys. On either side rise giant hills with steep sides, with only this narrow way between. You are now in a valley that may be three or four miles in length, through which you gradually wind your way to the level region below. The contrast met here is so marked that all who have passed between the two countries remark it. The hills, bananas, and rich grassy lands are left behind, and you have instead rugged hillsides covered with scraggy bush. If the season be October or November, the contrast is all the more marked, for everything in the country we are approaching is parched and dried, the trees are leafless, and the hillsides bare. The character of the two countries is very different; the one is high, rich, and grassy, with few trees but many bananas; the other is level, stony, poor, and covered with scraggy bush. Descending towards the plateau, you cross and recross a noisy stream that runs to the Songwe river, and at the foot cross this river itself as it is winding its way to the lake amid the hills of Mwen-

emesuko's country. The Songwe here will be 25 or 30 yards wide, and in November is waist deep, but during the rains is a wild torrent. On the banks is the village of Chinga. What a contrast is this people from those we have just passed! All the villages on the plateau, from here right on to Tanganyika, and north and south of the road thither, are stockaded. That is to say, all the houses in the neighbourhood are built in a cluster with a palisade of strong trees around, while outside is a ditch of 20 feet deep and 10 broad encircling the trees, and thorns are hung high up and around. The site is usually on the side of a stream or where two streams meet. All the people in the country live inside such an erection with their cattle, sheep, goats, fowls, and every other belonging. As the native knows nothing of sanitation, he pays no heed to it; as a consequence the villages are simply abominable from filth of every kind. During the rainy season the smell of the village can be felt long before it is reached. The people do not take to such a life willingly, for they are naturally cleanly, but are driven to this unnatural existence by their enemies. On one occasion, when their enemies, the Awawemba, were hovering about with guns on a raiding expedition, I knew of the people being cooped in such an enclosure—men, women, children and cattle—for three days, during which no creature passed out, and so excited were the women that they were unable to cook food or eat. Villages such as these are not numerous in the country, but scattered, and on an average one will be found every two or three miles, while great tracts are found without an inhabitant. The soil in some parts is good, but most of it is poor, being hard, clayey and stony. The people seldom make their gardens near their villages, but far off in the bush. Two months or so before the rains they select a spot and cut down the trees: then, gathering branches from the neighbourhood, collect all in a heap, perhaps 2 feet high over half an acre, let them lie and dry. At the beginning of the rains these dried branches are burned and the ash hoed into the soil. This is the only manure they adopt. The trees are thus pollarded for long distances around, and the country side stripped of its beauty. For miles often, between the villages, the country has thus a bleak, desolate look.

The geographical interest attached to this plateau is very great. The mission station at N'cherenji is on the edge of a level plateau extending as far as the eye can reach to the south and west and, on an average, about 3700 or 4000 feet of elevation above the sea. To the north-west an extensive range of hills is seen, which is high and runs for many miles, while to the south is another range extending far to the south and west. I had the privilege, three and a half years ago, of visiting Mwenepangara at his village, 15 miles to the south-west. It is on the banks of the Loangwa river, which here is large, with steep, well-wooded banks, and would be knee-deep. A smaller river, the Songole, runs into the Loangwa at the village. On the way we passed several small streams running south-west, and several others had dried up. Travelling due west along the Stevenson road for the first day, streams are met running south into the Loangwa river, but beyond Zoche, at Nyimbo, streams are passed which run more south and west into the river Chambezi. Here, then, is an interesting fact. Within a radius of

one and a half days' journey from N'cherenji on the plateau you can stand on waters that run into Lake Nyassa, waters that run into the Loangwa, and thence to the Zambezi and Indian Ocean, and on waters that run into the Chambezi and Bangweolo, and eventually into the Congo and Atlantic. All this within a radius of 30 or 40 miles. I have over and over heard from the natives for the last three years that there is a small lake on the Chambezi river, some eight or ten days' march due west or south-west from N'cherenji. They say it is not a marsh but a lake like the north of the Nyassa, with boats on it, and with high hills at the opposite side, and that no white man has ever been there. What this rumour may be remains to be seen.

On the 4th November last, with four personal servants and six bearers, I set out to visit a country lying to the north-west of N'cherenji, in fulfilment of a long-standing promise made to an Unyika chief. My route lay for two and a half days along the Songwe river, and through the country of Uwurambia and Mpoko. The first two hours' walk took us to several of Nyondo's villages. Nyondo is an old infirm man, who is living on the greatness of a name that has now long lost its glory. The village of Chinunka is on the Kaseya stream, and is situated near to Chinga, at the foot of a long chain of hills and near to a bad-smelling spring from which it takes its name. Two hours more took us to Kapenda, a village recently deserted. A few weeks before we arrived, a lion had scaled the stockade at dead of night and attacked a villager, when there was a general stampede to the hills. My boys led me reverently to a small hut inside the village raised over the spot where the late Nyondo sleeps, and where his *usyuka*, or spirit, rests. The villagers constantly make offerings of food and beer to the spirit of the great departed. Six hours more brought us through a poor country, level, and fairly well wooded, to the village of Mwenepoko, called Sokania. This country has suffered greatly through the ravages of the Awawemba tribe, who are armed by slave-dealing Arabs, and come from the country north and east of Bangweolo. Five villages in this neighbourhood have lately been destroyed, and the people carried off or driven to the hills. The men, with deep emotion, pointed out to me the paths these desperadoes took when, in the darkness of night, they entered their country. Sokania is on the banks of the Songwe, which here runs at the foot of another range of hills, stretching to the north-east. All next day our course lay along the banks of the Songwe, when we passed several villages, as Penza and Chitete. The Songwe here runs through a long valley, formed by the Chingambo Mountains to the west, and the Bundale hills to the east. Chitete is on the confluence with the Songwe of a small stream, the Kantesia, which comes from the Chingambo Mountains to the west and north. The chief was suffering from a bullet wound in his right shoulder. In a fight a year ago with Chikanamalira, the chief of Inyamwanga, he was wounded and nearly lost his life. This Chikanamalira has lately had extensive dealings with Arabs, and has been supplied with guns and powder, and has lately begun to molest the weaker villages around him. He attacked this village a year ago, wounded the chief, killed several men, and carried off all the cattle.

Here the Songwe river takes a decided bend to the north-east, and, in many rivulets, comes from the Busango Hills, the country occupied by Merere. At Chitete the Songwe may be about twelve yards wide and knee-deep.

We have now entered the country of the Awanyika, who present many characteristics different from the Awanyakyusa. They are physically not so good-looking, being long and lean and lank, with round bullet heads. Hair on their bodies is abundant, and most of them take great delight in adorning their heads, which often appear as great greasy masses. They are all decently clothed with a coarse native cloth, and, being adepts in plaiting, their ankles and arms and waists are covered with plaited ornaments. Their villages are the reverse of those we saw on the hills and plains north of Lake Nyassa. They are stockaded, and filthy in the extreme. Bananas are unknown, and there are but few cattle. The neighbourhood of a village is a pestilent dunghill. Yet this is a brave people, and not without many of the more manly and kindly qualities. Some of the best servants I have ever had have come from this people. A great deal depends on the season at which one sees a country as to how he is impressed by it. I saw it at the beginning of the rains, and to me it was very beautiful. Green grassy plains and ridges abounded, with clumps of trees in the distance. Deer, buffalo, and elk were seen in herds. Iron abounds, and is smelted and extensively wrought into spears, hoes, axes, etc. Wild cotton grows plentifully and is woven into pretty patterns of cloth. Every village boasts of two or three looms. The industry and skill of the people of Unyika greatly impressed me. Traces of ironstone are found everywhere, and, in places, old workings are seen. On one hillside I counted five smelting kilns, standing in the bush not many hundred yards from one another. These stand fully nine feet high, five feet in diameter at the base, and three at the top, and are built of reeds and clay. They will contain half a ton of iron ore. They use charcoal when smelting, and are well acquainted with the working of iron. The ore found is the brown hæmatite, which is very hard and compact, and is often found in beds of a few feet thick.

At this village of Chitete, on the 6th November, I was overtaken by Mr. H. H. Johnston, English Consul at Mozambique, who was travelling with a large caravan of about 150 persons from Nyassa to Tanganyika, and, as we were both going north-west, we journeyed together. Next day we crossed the Kantesia stream, and passed several villages which had lately been destroyed by Chikanamalira. Most of the stockades were standing, with the houses and grain stores inside, but not a creature was near. Several streams were passed, all running to the Kantesia. At Mwembe village we slept, and next day camped at the village of Seruka, belonging to Nwenechumia, which is on the bank of a small stream, the Msankwa, which runs in the opposite direction from those we have just crossed, namely, north-west into the Nkanna. This village we found to be 4661 feet high. Here Mr. Johnston was to have left me on his journey west to Tanganyika, but, hearing from the natives that Lake Rukwa was only three days off, he determined to join me and visit this little-known water. From the camp at Seruka we travelled nearly due

north, and crossed a fine stream, the Nkanna, running west. I afterwards crossed several rivulets of this stream high up, on my way back. It runs west through the Inyamwanga country till it joins the Saisi coming from Mambwe, which enters Rukwa at its south-west shore. Crossing the Nkanna we passed several villages, as Bandawe and Itimba, and crossed a stream, the Rehimba, running to the west. Pushing on, we lost our way, and did not come to a village till the sun had set, which gave us not a little anxiety. It is a wise precaution in travelling in a new country, to send one or two men ahead to tell the people of your being in their country, and that you come with no malicious intent. On this day, having lost our way, we did not act on this plan, and got into trouble. As we approached the village of Marawantu, under a chief called Zowe, we were met by quite a crowd of natives, who stood outside their village armed with guns, and looking at us in sullen silence. To our salutations they returned no answer, and refused at first to have dealings with us. After our wearied bearers had thrown down their loads to rest, Mr. Johnston and I, with two interpreters, entered the village to talk with the chief. Once inside they shut the gate and kept us in. For a little time we stood confronting one another, not knowing well what to do, when, seeing an Albino, we made some jokes at his expense, and, creating a laugh, we were soon good friends. After waiting a little we saw the chief, got a place to camp, water and food, and were altogether hospitably entertained.

Leaving Zowe's village next morning, we were assured that if we walked steadily we might see the lake at midday. Accordingly pushing on, about two in the afternoon, when rounding the brow of a hill we got a magnificent view of this curious lake, which had been so long heard of and seen only once before. Stretching out as a great sheet of glimmering water was Rukwa, or Hikwa, or Urukugha, or Leopold, as it has been variously named. To the east it seemed surrounded by a high range of mountains, while away to the north we saw nothing but the bluish haze of the water where the lake and horizon seemed to meet.

We were not yet, however, at the lake ; it might be 40 miles distant, with hill and bush and sandy plain between, but we were viewing it from a height of several thousands of feet. Pushing on we began to descend, and for fully 5 hours traversed terrace after terrace, sometimes going down steep inclines, and not till it was quite dark did we reach a spot on which we could camp. The spot selected was the dry bed of a stream where water was only to be had by digging, and poor water it was. Up till now we had had no communication with the natives, and from all we could learn they were not at all friendly. At the first streak of dawn our guides returned with news that we were invited to the nearest village, whereon we pushed forward. Two hours' walk brought us to Ntuka, a village built on an escarpment of limestone rock, and belonging to one Kibwana. Here we learned that a messenger had been sent to the Sultan, as they call the chief, and that we must await his answer. And so we rested in a burning sun with little food and no water. On every hand the country was bare and burned, with no trees near, except the wildest and thorniest of acacia. At midday we bought some water, such as it was, and

gave every follower a couple of spoonfuls. At last we were invited to come on to Mwenewungu's village. Starting about two in the afternoon, we journeyed in a blazing and fierce sun, during which we all suffered greatly, and at night camped on the bank of a reedy pool. Next day continuing the trudge, we reached a small river, the Songwe, which here meanders over the plain and enters the lake at the south. In the afternoon Mr. Johnston and I with a few guides went on to the village to confer with the chief. The ground then was so hot that, suffering in their feet already, most of our men had invested in sandals made from buffalo hide. Here the people seldom walk abroad in the heat of the day, and when forced to it as they were this afternoon, don't walk, but rush through the fierce heat from the shade of one tree to another. Taken into the village, we had an audience with the chief and his councillors, and that audience put us somewhat about. He was tipsy and boastful, and had all the appearance of a treacherous, weak, bad man, while his people with their many guns bore a like character. That night Mr. Johnston resolved, I think most wisely, that he would leave this inhospitable people and country with all possible haste. He had 150 followers, the country was unhealthy, food there was none to be bought, and the water of the Songwe river was hot and unpleasant, and, to crown all, the natives were inhospitable. At three next morning Mr. Johnston left me and my little band of ten men, and retraced his steps towards the road he had left. At daybreak I went into Mwenewungu's village, explained the retreat, and boldly asked him for a house to sleep in. This he kindly gave me after a little, and for a week, while I rested in his village, supplied my men with grain and meat. But I had not yet reached the lake, and I was determined that I would. Making every arrangement about men and guides, we left next morning about 4.30, in order to escape the fierce heat of the day. Here life usually begins in the small hours of the morning, and all rest at midday. Our path lay due NW. for several miles along the bank of the Songwe. Leaving the river, we crossed several dry beds of rivers which run from the hills on the east, as the Ruika, the Jangwa and the Kiringa. As I saw them, they were merely dry ravines, but, as some of them had native bridges of considerable width, I take it that at one time they were considerable streams. I never before saw so many herds of water-buck and other deer as I saw on this walk, attracted, I presume, by the brackish water. After a journey of twelve miles we reached the SE. corner of the lake and rested at a small village called Kipindi, built on the hillside a little above the lake. Lake Rukwa I take to be much larger than has hitherto been believed, and it extends much more to the S. and E. than is indicated by the dotted lines on the map. It may be 80 or 90 miles in length, and longitudinally lies NNE. and SSW., and in all probability bends at its southern extremity much to the east. Some natives assert that it would take many days to go round it, but that it is never done owing to enemies. Its waters are dark in colour, very brackish, quite undrinkable and muddy. The youth who brought me specimens of its water had to go into the lake for 300 yards before he could dip the bottle, and was then knee-deep in mud. It is merely the vestige, the shrunken vestige, of a much greater lake. As we

trudged along the guide pointed to several trees that, some years ago, were at the water's edge, but which are now two miles from the water. As there has been no rainfall here for two years back, I take it that the lake is rapidly evaporating, and that during an exceptionally wet season the bordering level will be greatly submerged. Every native I have questioned says the lake has no outflow, and that, I think, cannot be doubted. We conclude therefore that a balance is kept on this lake between its evaporation and rainfall. Fish are numerous, but are not much sought after by the natives. I saw no hippopotami nor crocodiles, nor canoes, in its dark waters. The sand, or rather mud, on its shores was covered with a white crustaceous deposit of some white salt, and where the water has quite evaporated, the mud is extensively cracked. It is skirted on its E. shore by a range of peculiarly rugged mountains which rise in rugged peaks, or, at other places, have table tops and rise in sheer precipices from the water. I do not imagine that on the east shore there is any native path. At the SE. corner there seems to be an inlet into the mountains, forming a bay, but I did not reach that point. On the south and west, as far as the eye could carry, the water was skirted by a plain not many feet above the level of the water and covered with bare sandy patches, long grass and thorny acacia trees. This plain may be from 20 to 30 miles in width, and represents what may at one time have been a much higher level. The west shore belongs to the Awafipa, and the east to the Awakhonongo, while the south belongs to the Awaungu under the chief Mwenewungu. Formerly this country was rich in elephants, but these have recently migrated to the hills on the east. They are said to be plentiful four or five days' journey off. The natives still hunt extensively, and were well armed and well clothed. Buffalo are very plentiful, as are deer and wild pig. Some of the finest buffalo horns I have ever seen were here, a heap of which lay inside the gate of every village. No rain has fallen for two years, and consequently they have no gardens, but live on the fruits of the chase—white and black ivory. The slaves they send, according to their own words, to the Unyamwezi country.

I lived in the village of Mwenewungu for fully a week and had long and interesting conversations with the people, who were not unkind. The chief manifested a strange reluctance to part with me, which I could not understand, and I broke suddenly off at the end of a week. The first two days of the return journey led me along the banks of the Songwe river, nearly due east. This river, to my surprise, grew broader and deeper as I went nearer its source, and presents an example of a river running through a sandy dry plain losing itself in its course. Its banks were well wooded and very green, and presented quite a contrast to what it is in the country of the Awaungu. At the village of Kanga, six miles from Momvongo on the banks of the Songwe, I found two old English cannon that had been brought there by the Arabs. They were three feet long and as much as a man could move. They are loaded with broken pieces of iron, and used against villages in slaving expeditions. In the neighbourhood of Mireya, just before we scaled the hills and left this plain of Rukwa, I was much struck by the great beds of limestone, or chalk, through which the Songwe runs. The river has cut its way through great beds of this rock, which present the most perfect striation

I have ever seen, and are several hundreds of feet in height. With my servants I gathered many small univalve and bivalve shells, which are found in abundance in the chalky beds.

The three countries referred to in this paper embrace the border-land that lies between German East Africa and Nyassaland as claimed by England, and are at this moment the subject of dispute. It may therefore not be out of place here to recall the simplef acts as to what these two nations have done for the country. The north of Nyassa was visited by Young fourteen years ago; by Consul Elton in 1878; by Thomson in 1879; and the road between the two lakes Nyassa and Tanganyika was surveyed by Mr. Stewart in the same year, 1879. Fifty-two miles of that roadway, in by far the most difficult part of the country, has been already made, and bears the name of Stevenson, thus named at first by German geographers. The African Lakes Company have had agents travelling and trading there for the last nine years, while Scotch missionaries have occupied the hills for six and a half years. The language of the people has been acquired and friendship thoroughly established. The graves of seven English subjects are there. Giraud and Captain Trivier, two French travellers, have travelled in the country, while Lieutenant Wissmann, in 1887, travelled from Tanganyika to Nyassa. Are we as Englishmen, after all that has been done, to allow these lands and this interesting people to pass beyond our influence and sympathy?

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## THE MAPPING OF THE WORLD.

By John George Bartholomew, F.R.S.E., F.R.G.S.

(*With Map.*)

### PART I.—INTRODUCTORY.

At the present day the use of good maps is a matter of recognised importance—to the scientist, the merchant, and the tourist, as well as to the soldier and the statesman; and it is evident that the demand for improvement in cartography must increase with the progress of education. We have no cause to complain of a dearth of maps—their name is legion: but as many of them are founded on inaccurate knowledge or topography before the days of surveys, it is evident that a guide to those that are most recent and reliable is very much needed.

The object of this paper is not to give a history of cartography, nor to tell *how* the world is mapped, but to present the best results of cartographical work throughout the world as published at the present time—in fact to indicate the *Best Maps* at present available for every part of the world, be they exact topographical surveys or travellers' sketches. Although from time to time many valuable reports have been published dealing with the extent of Official Topographical Surveys, yet I do not know of any that treat, in the manner I propose, of the general mapping of the whole land-surface of the world: there is no guide that goes beyond the region of surveys, and, failing the existence of an official map, mentions the best map from other sources.

From 150 A.D., when Ptolemy made the first atlas, down to the middle of last century, the whole art of map-making had been left to private enterprise, and although the maps of Mercator, Homann, the Sansons, de l'Isle, Blaeu, and d'Anville, marked great advances, yet comparatively little progress in really accurate cartography was made until a system of exact trigonometrical surveying was adopted, and governments saw the desirability of instituting surveys at the cost of the State. As the prime objects of these surveys have been principally military, they have in most countries been carried out by specially trained officers of the general army staff, and are therefore known as Ordnance Surveys. In the United Kingdom the first attempt at a systematic survey was commenced in 1747 by General Watson and General Roy, and resulted in a map of the Scottish Highlands, with part of the Lowlands. In 1763 the project for a general survey under the direction of General Roy was considered by the Government, but owing to foreign wars, procrastination, and other causes, it was not until 1784 that definite operations were commenced. On the Continent, in 1750, France was the first country to undertake a general survey, but now, in 1890, almost the whole of Europe has been mapped by its various States in beautiful and elaborate detail. Turkey, and its neighbours in the Balkan Peninsula, alone rest in a state of geographical torpor and inactivity, and in Spain, although there is progress, yet it is characteristically slow.

TABLE SHOWING EXTENT OF DETAILED TOPOGRAPHICAL SURVEYS THROUGHOUT THE WORLD.*

| Continental Divisions. | Area in Sq. Miles. | Area undergoing Survey. | Area not undergoing Survey. | Remarks. |
|---|---|---|---|---|
| Europe, . . | 3,757,000 | 3,413,000 | 344,000 | All except Turkey, Bulgaria, Greece, and Luxemburg. |
| Asia, . . . | 17,213,000 | 2,368,000 | 14,845,000 | Only India, Java, and part of Japan. |
| Africa, . . | 11,515,000 | 280,000 | 11,235,000 | Only Algeria, Tunis, and Egypt. |
| North America, . | 7,900,000 | 2,000,000 | 5,900,000 | Geological Surveys of United States and Canada in progress. |
| South America, . | 6,855,000 | ..... | 6,855,000 | No detailed Surveys. |
| Australasia, . | 3,200,000 | ..... | 3,200,000 | Do. |
| Polar Regions, . | 2,000,000? | ..... | 2,000,000 | Unexplored. |
| Totals, . | 52,440,000 | 8,061,000 | 44,379,000 | |

Taking a general view of the surveys of the world it will be seen from this table that, excepting the European States and their possessions, comparatively little has been done, and that of the whole land-surface of the globe only about one-seventh has been exactly surveyed, while the remaining six-sevenths, with a population of about nine hundred millions, is only very imperfectly mapped. It also appears that outside of Europe few States have attained to that stage of education or commercial importance

* The figures here given are merely approximate.

when the possession of an exact survey is a necessity, or, where such has actually been commenced, it is still far from completion, while there further exist large regions, as in Africa, without any civilised form of government, which are only very imperfectly known, if not altogether unexplored.

From the foregoing table it is evident that my work would be comparatively simple if it did not go beyond the surveys, and give the best map which in the meantime stands in their stead. For almost every part of the world we have maps of a certain value, but it is desirable to know what that value is besides knowing that it is the best existing map. In order to give this information I have adopted a general classification which will suffice for ordinary reference.

To begin with, maps may be divided into two classes, Geographical and Topographical, the former being either general, such as maps of the world and the continents, or particular (called also chorographical), such as maps of countries and provinces. Topographical maps differ from Geographical by their extensive detail, and in order that every feature of the land-surface, both natural and artificial, may be represented, the scale must be proportionally large. Where they exist, the topographical survey maps are what may be called the "mother maps," because it is from them that all the smaller maps are produced. However, over the world at large the value of the "mother map" varies very much; it is not always advanced to the topographical stage—for in some countries the *best* maps are very defective. In the map accompanying this part of my paper, I have used the following classification to give a general idea of the value of the best maps for every part of the world:—

1. Detailed Topographical Surveys, the result of exact trigonometrical work.
2. Topographical Maps, the result of general but not detailed survey.
3. Detailed Geographical Maps, fairly reliable throughout, compiled from numerous observations and itineraries.
4. General Geographical Maps, in many cases only approximate or hypothetical, sketched from single itineraries and reports.

These main divisions are, however, very general, and will in many cases be subdivided, as in dealing with the Maps of Europe, which here follow.

## Europe.

Topographical Government Surveys exist for almost the whole of Europe, and in the case of the Balkan States, where the lethargy of the Turk has deterred him from mapping his country, the work is being done for him by the enterprise of the Russians, the Austrians, and the Germans, who seem more interested in the geography of the Balkan Peninsula than its own inhabitants.

As for different uses different scales of maps are required, I have thought it well to divide the maps of Europe into classes that may serve to guide the inquirer to the kind of map desired. The index letters agreeing with the following classification will be prefixed to each of the maps in the lists according to their scale.

A.[1] Detailed Topographical Surveys on scales from 1 : 20,000 to

[1] In the list of Survey Maps I have only dealt with the general surveys of countries and not taken into account special local surveys and town plans.

1 : 100,000, from about $\frac{1}{2}$ of a mile to $1\frac{1}{2}$ miles to an inch, or such as show clearly the work on larger topographical plans, although they do not represent the single small details with the same clearness. Such maps are prepared principally for military, but are also valuable for economic and scientific, uses. In the case of the British Isles I have made an exception to Class A by including the six-inch survey, it being now almost completed for every part of the country.

B. Detailed Maps from the scale of 1 : 100,000 to 1 : 500,000 or from about $1\frac{1}{2}$ to 8 miles to an inch, which, with increasing reduction of scale, demand a corresponding simplification of the material, but in which all the important features stand out, and less important details are generalised. The maps in this class show all the principal roads, and are the most generally useful for travellers or tourists.

C. General Maps from the scale of 1 : 500,000 to 1 : 1,500,000 or from about 8 to 24 miles to an inch. In these maps the simplification is carried still further, as the scale will only admit of the leading features being shown, such as the hill-ranges and principal peaks, larger streams and rivers, towns and villages, railways and principal routes.

The following tables have been carefully compiled from the various official catalogues and reports: only the most recent maps are noted, all old surveys have been omitted, and in every case, according to our knowledge, only the best maps of each country are mentioned. In the compilation of the tables I must acknowledge my indebtedness to the kind assistance of Mr. Friedrich Bosse, especially in connection with his critical knowledge of foreign topographical maps.

## THE TOPOGRAPHICAL MAPS OF EUROPE.

*Names of Maps published by Private Firms are printed in Italics.*

Only the best and most recent Government and private publications are here mentioned.

| Country. | Title of Map. | Scale. | | Sheets | | Date. | Price per Sheet. |
|---|---|---|---|---|---|---|---|
| | | Natural Scale. | Miles to Inch. | Total Number | Number Issued. | | |
| **CENTRAL EUROPE.** | B. Topographische Spezialkarte von Mittel-Europa (Reymannsche). Königl. Preuss., Generalstab, Berlin, . . | 1 : 200,000 | 3·1 | 796 | 487 | 1874 | 1s. |
| | B. Generalkarte von Central-Europa. K. K. Milit. Geogr. Institut., Wien, . . . | 1 : 300,000 | 4·7 | 192 | 192 | 1878 | 1s. 4d. |
| | B. Generalkarte von Mittel-Europa. K. K. Milit. Geogr. Institut., Wien, . . . | 1 : 200,000 | 3·1 | | 8 | 1888 | |
| | C. Uebersichtskarte von Mittel-Europa. K. K. Milit. Geogr. Institut., Wien, . . . | 1 : 750,000 | 11·8 | 45 | 45 | 1887 | 2s. |
| | B. Carte de l'Europe Centrale. Dépôt de la Guerre, Paris, . | 1 : 320,000 | 5·0 | 52 | 27 | 1868–77 | 8d. |
| | C. Carte militaire des principaux Etats de l'Europe. Dépôt de la Guerre, Paris, . | 1:2,400,000 | 37·8 | 4 | 4 | 1832 86 | 25s. |
| | *B. Special-Karte von Mittel-Europa. Von W. Liebenow. H. Oppermann, Hannover,* . | 1 : 300,000 | 4·7 | 164 | 164 | 1889 | 1s. |

| Country. | Title of Map. | Scale. | | Sheets. | | Date. | Price per Sheet. |
|---|---|---|---|---|---|---|---|
| | | Natural Scale. | Miles to Inch. | Total Number | Number Issued. | | |
| **Central Europe** —*continued.* | *C. Karte von Central Europa zur Uebersicht der Eisenbahnen, einschliesslich der projectirten Linien, der Gewässer und hauptsächlichsten Strassen. Berlin: Berliner Lithogr. Institut,* | 1:1,250,000 | 19·7 | 6 | 6 | 1888 | 6s. |
| | *C. Raab, Special-Karte der Eisenbahn Post- und Dampfschiff-Verbindungen Mittel-Europa's Rev. von W. Koch. Glogau: Flemming,* | 1:1,250,000 | 19·7 | 6 | 6 | 1888 | 6s |
| | C. Carte des chemins de fer. Serv. Geogr. de l'armée, | 1:1,200,000 | 18·9 | 3 | 3 | 1887 | 1s. 3d. |
| **MEDITERRANEAN.** | *C. Das Mittelländische Meer. Von Dr. A. Petermann. Gotha: Justus Perthes,* | 1:3,500,000 | 55·2 | 8 | 8 | 1883 | 8s. |
| **AUSTRIA-HUNGARY.**[1] | A. Neue Spezialkarte der Oesterreichisch-Ungarischen Monarchie und des Okkupationsgebietes. Gradabteilungskarte (30′ lat. 15′ long.) K. K. Milit. Geograph. Institut. in Wien. (With hills), | 1:75,000 | 1·18 | 760 | 760 | 1870–90 | 1s. |
| | B. Generalkarte der Oesterreich-Ungarischen Monarchie. K. K. Milit. Geograph. Institut. | 1:300,000 | 4·73 | 72 | 72 | 1878 | 1s. 4d. |
| | C. Neue Uebersichtskarte von Oesterreich-Ungarn, | 1:750,000 | 11·83 | 14 | 14 | 1886–87 | 2s. 1d. |
| | C. Die Oesterreichisch-Ungarische Monarchie mit ihrer politischen Einteilung und den Ortsgemeinden von 5000 und mehr Einwohnern, | 1:1,200,000 | 18·93 | 4 | 4 | 1885 | 4s. 8d. |
| | C. Die K. K. Oesterreich-Ungarische Monarchie mit dem Okkupationsgebiet Bosnien und der Herzegowina (Hypsometrical), | 1:900,000 | 14·20 | 6 | 6 | 1887 | 18s. |
| | *C. Karte von Oesterrich-Ungarn. Von C. Vogel (With Index) Gotha: Justus Perthes,* | 1:1,500,000 | 23·67 | 4 | 4 | 1889 | 6s. |
| | *C. Uebersicht der Eisenbahnen der Oesterreichisch-ungarischen Monarchie. Wien: Artaria & Co.,* | 1:1,000,000 | 15·78 | 6 | 6 | 1881–88 | 12s. |
| | *C. General-Strassen- und Ortskarte der Oesterreich-Ungarischen Monarchie. Wien: Artaria & Co.,* | 1:1,296,000 | 20·4 | 4 | 4 | 1881 | 9s. |
| AUSTRIA. | *B. Special-karte von Oesterreich unter der Enns. Von R. A. Schulz. Wien: Artaria & Co.,* | 1:324,000 | 5·1 | 1 | 1 | 1881 | 4s. |
| ,, | *B. Special-karte des Erzherz. Oesterreich ob der Enns. Von A. Stienhauser. Wien: Artaria & Co.,* | 1:432,000 | 6·8 | 1 | 1 | 1881 | 4s. |
| BOHEMIA. | *B. General-karte von Böhmen. Von A. Steinhauser. Wien: Artaria & Co.,* | 1:432,000 | 6·8 | 1 | 1 | 1886 | 4s. |
| ,, | *C. General-Post- und Strassenkarte von Böhmen. Von. F. Fried. Wien: Artaria & Co.,* | 1:642,000 | 10·1 | 1 | 1 | 1886 | 3s. |
| BOSNIA. | B. General-karte von Bosnien und der Herzegowina. K. K. Milit. Geograph. Institut. in Wien, | 1:150,000 | 2·38 | 19 | 19 | 1884–85 | 2s. |
| CARINTHIA. CARNIOLA. DALMATIA. | *See* Alps and Austria-Hungary, *See* Alps and Austria-Hungary, *See* Austria-Hungary, | | | | | | |

[1] *Agent: R. Lechner, Vienna.*

| Country. | Title of Map. | Scale. | | Sheets. | | Date. | Price per Sheet. |
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| | | Natural Scale. | Miles to Inch. | Total Number | Number Issued. | | |
| **Austria-Hungary** —*continued.* | | | | | | | |
| GALICIA. | *B. Administrationskarte von den Königreichen Galizien und Lodomirien. Von Kummersberg, Ritter von Kummersberg.* Wien: Artaria & Co., . . | 1 : 115,200 | 1·80 | 61 | 61 | 1881 | 1s. |
| | *C. General-Post- und Strassenkarte des Königreichs Galizien und Lodomirien. Von R. A. Schulz.* Wien: Artaria & Co., . . | 1 : 880,000 | 13·8 | 1 | 1 | 1887 | 3s. |
| GOERZ AND ISTRIA. (Küstenland). | *See* Austria-Hungary, . . | | | | | | |
| HUNGARY. | B. Karte des Königreichs Ungarn K. K. Milit. Geogr. Institut. in Wien, . . . . | 1 : 144,000 | 2·2 | 141 | 141 | 1861–85 | 8d. |
| MORAVIA AND SILESIA. | *B. Karte der Markgrafschaft Mähren und des Herzogthums Schlesien. Von A. Steinhauser.* Wien: Artaria & Co., . . . | 1 : 432,000 | 6·8 | 1 | 1 | 1881 | 4s. |
| STYRIA. | *B. General-post- und Strassenkarte des Herz. Steiermark. Von R. A. Schulz.* Wien: Artaria & Co., . . . . . | 1 : 400,000 | 6·3 | 1 | 1 | 1888 | 3s. |
| TYROL AND VORARLBERG. | *B. Karte von Tirol und Vorarlberg. Von A. Steinhauser.* Wien: Artaria & Co., . . | 1 : 432,000 | 6·8 | 1 | 1 | 1882 | 4s. |
| ,, | *See* Alps and Austria-Hungary | | | | | | |
| **BALKAN STATES.**[1] | B. Generalkarte von Central-Europa. K. K. Milit. Geogr. Institut., Wien. (See Europe), | 1 : 300,000 | 4·7 | 192 | 192 | 1878 | 1s. 4d. |
| | C. Der Europäische Orient. K. K. Milit. Geogr. Institut., Wien, . . . . . | 1:1,200,000 | 18·9 | 4 | 4 | 1887 | 7s. 2d. |
| | B. Map of the Eastern Part of the Balkan Peninsula (in Russian). Military Topogr. Bureau, St. Petersburg, . | 1 : 126,000 | 1·9 | 67 | 67 | 1883 | 3s. 2d. |
| | B. Special Map of Turkey in Europe (in Russian). Military Topogr. Bureau, St. Petersburg, . . . | 1 : 420,000 | 6·6 | 17 | 17 | 1879-84 | 2s. |
| | *C. Von Schuda's Generalkarte der Balkanländer. Von A. Steinhauser nach den neuesten officiellen Materialien gänzlich umgearbeitet. Wien: Artaria & Co., . . . . . | 1:864,000 | 13·6 | 13 | 13 | 1886 | 18s. & 21s. |
| | *C. Generalkarte der Südost Europäischen Halbinsel. Von H. Kiepert. Dietrich Reimer, Berlin, . . . . . | 1:1,500,000 | 23·6 | 3 | 3 | 1885 | 4s. 6d. & 7s. |
| | *C. Karte der Balkanhalbinsel von C. Vogel. With index. Gotha: Justus Perthes, . . . | 1:1,500,000 | 23·6 | 4 | 4 | 1890 | 6s. |
| BOSNIA, BULGARIA, AND EASTERN ROUMELIA | *See* Austria-Hungary. B. Map of Bulgaria, Eastern Roumelia, etc. (in Russian). Military Topogr. Bureau, St. Petersburg, . . . . | 1 : 210,000 | 3·3 | 56 | 56 | 1880-83 | |
| ,, | B. Carte de la Bulgarie. Dépôt de la Guerre, Paris, . . | 1 : 800,000 | 12·6 | 1 | 1 | 1876 | 10d. |
| ,, | *B. Special-Karte von Bulgarien. Von H. Kiepert. Berlin: Dietrich Reimer, . . . .* | 1 : 540,000 | 8·4 | 2 | 2 | 1877 | 4s. |
| ,, | *B. Special-karte vom östlichen Rumelien. Von H. Kiepert. Berlin: Dietrich Reimer, .* | 1 : 540,000 | 8·4 | 2 | 2 | 1877 | 4s. |
| ,, | *C. Bulgarie et Roumélie Orientale. Par F. Bianconi. London: Tamini, . . . . .* | 1:1,000,000 | 15·7 | 1 | 1 | 1888 | 5s. |
| GREECE | *See* Europe, No. 2. | | | | | | |
| ,, | B. Carte de la Grèce. Dépôt de la Guerre, Paris, . . . | 1 : 200,000 | 3·9 | 20 | 20 | 1852-80 | 8s. 4d. |

[1] *Agent: R. Lechner, Vienna.*

| Country. | Title of Map. | Scale. | | Sheets. | | Date. | Price per Sheet. |
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| | | Natural Scale. | Miles to Inch. | Total Number | Number Issued. | | |
| **Balkan States**—*continued.* | | | | | | | |
| GREECE | B. Karte von Griechenland. K. K. Milit. Geogr. Institut., Wien, rev. von H. Kiepert, | 1:300,000 | 4·7 | 11 | 11 | 1885 | 1s. 4d. |
| ,, | *C. Karte von Hellas oder Griechenland. Von H. Kiepert. Berlin: Dietrich Reimer,* | 1:1,000,000 | 15·7 | 1 | 1 | 1885 | 1s. 2d. |
| ,, | *C. A. Steinhauser, Generalkarte von Griechenland. Nach von Schedas grosser Karte der Balkanländer. Wien: Artaria & Co.,* | 1:864,000 | 13·6 | 3 | 3 | 1885 | 1s. 8d. |
| ROUMANIA | Survey in progress. Already published: Dobrudja. Scale 1:10,000, and a reduction 1:200,000. *See* Europe, No. 2 and 4; *See* Maps of Central Europe, | | | | | | |
| SERVIA | A. Topographical Map of Servia. Royal Servian General Staff. | 1:75,000 | 1·1 | 112 | 35 | 1888 | s. 2d. |
| ,, | *C. A Steinhauser, Generalkarte des Königr. Serbien nebst den angrenzenden Gebieten. Wien: Artaria & Co.,* | 1:864,000 | 13·6 | 1 | 1 | 1885 | 1s. 8d. |
| EPIRUS AND THESSALY | *See* Europe, No. 2. B. *Carte de l'Épire et de la Thessalie. Von H. Kiepert. Berlin: Dietrich Reimer,* | 1:500,000 | 7·8 | 1 | 1 | 1885 | 4s. |
| **TURKEY.** | *B. Carte générale des Provinces Européennes et Asiatiques de l'Empire Ottoman (sans l'Arabie). Von H. Keipert. Berlin: D. Reimer.* | 1:3,000,000 | 47·3 | 4 | 4 | 1885 | 8s. |
| **BELGIUM.**[1] | A. Carte Topographique de la Belgique (full-coloured), | 1:20,000 | 0·3 | 427 | 427 | 1866–80 | 1s. 8d. |
| | Carte Topographique de la Belgique (in black only), | | | | | | |
| | A. Carte Topographique de la Belgique (hypsometrical), | 1:40,000 | 0·6 | 72 | 72 | 1866–83 | 4s. 2d. |
| | B. Carte de la Belgique (route map, hypsometrical), | 1:160,000 | | 4 | 4 | 1884 | 2s. 6d. |
| | B. Carte de la Belgique (hypsometrical, | 1:320,000 | 5·0 | 1 | 1 | 1888 | 2s. 6d. |
| **BRITISH ISLES:** | | | | | | | |
| ENGLAND[2] | A. Six-inch Ordnance Survey, Index Map for each county. | 1:10,560 | 0·166 | .. | .. | 1846– | 2s. & 2s. 6d. |
| ,, | A. One-inch Ordnance Survey (old series), | 1:63,360 | 1 | 110 | 110 | 1801–5 | 1s. & 2s. 6d. |
| ,, | A. One-inch Ordnance Survey (new series), | 1:63,360 | 1 | 360 | 181 | 1874 | 1s. |
| ,, | *B. Bartholomew's Red. Ordnance Map* | 1:260,000 | 4 | 16 | 16 | 1888 | 1s. |
| ,, | *B. Stanford's Library Map,* | 1:381,000 | 6 | 4 | 4 | 1886 | |
| ,, | *B. Johnston's Modern Map,* | 1:443,520 | 7 | 4 | 4 | 1889 | 2s. |
| ,, | *C. Bartholomew's Tourist's Map,* | 1:633,600 | 10 | 1 | 1 | 1890 | 2s. 6d. |
| SCOTLAND[3] | A. Six-inch Ordnance Survey, Index Map for each county. | 1:10,560 | 0·166 | 2036 | 2036 | 1847 | |
| ,, | A. One-inch Ordnance Survey, | 1:63,360 | 1 | 131 | 131 | 1856–8 | 1s. 9d. |
| ,, | *B. Bartholomew's Red. Ordnance Map* | 1:126,720 | 2 | | | 1889 | 1s. |
| ,, | *C. Bartholomew's Tourist's Map,* | 1:633,600 | 10 | 1 | 1 | 1889 | 1s. |
| IRELAND[4] | A. Six-inch Ordnance Survey, Index Map for each county. | 1:10,560 | 0·166 | | | 1833 | |
| ,, | A. One-inch Ordnance Survey, | 1:63,360 | 1 | 205 | 205 | 1853 | 1s. |
| ,, | B. Ordnance Survey General Map, | 1: | 4 | 4 | 4 | | 4s. |
| ,, | *C. Stanford's New Map,* | 1:506,880 | 8 | 2 | 2 | 1880 | 8s. |
| ,, | *C. Bartholomew's Tourist's Map,* | 1:633,600 | 10 | 1 | 1 | 1888 | 1s. |
| CHANNEL[5] ISLANDS | *B. Stanford's Map of Channel Isles,* | 1:221,760 | 3·5 | 1 | 1 | .. | 1s. |
| | *A. Grigg's Map of Guernsey,* | 1:25,340 | 0·4 | 1 | 1 | 1888 | 1s. |
| | *A. Tibbler's Map of Jersey,* | 1:31,680 | 0·5 | 1 | 1 | 1888 | 1s. |

[1] *Agent: Institut. Cartographique Militaire, Brussels.*
[2] *Agent: E. Stanford, London.*
[3] *Agent: A. and C. Black, Edinburgh.*
[4] *Agent: Hodges, Figgis and Co., Dublin.*
[5] Maps very sketchy and imperfect.

| Country. | Title of Map. | Scale. | | Sheets. | | Date. | Price per Sheet. |
|---|---|---|---|---|---|---|---|
| | | Natural Scale. | Miles to Inch. | Total Number | Number Issued. | | |
| **DENMARK.**[1] | A. Malebordsbladene, . . . | 1:20,000 | 0·3 | 1209 | 887 | 1830 | 10d. |
| | A. Kaart over Jydland, . . | 1:40,000 | 0·6 | 131 | 79 | 1870 | 2s. 3d. |
| | Generalstabens Topografiske Kaart over Kongeriget, Danmark, . . . . . | 1:80,000 | 1·2 | 29 | 29 | 1870 | 2s. 3d. |
| | A. Danmark. De Danske Oer 1:80,000, Bornholm 1:40,000 | 1:40,000 | 0·6 | 6 | 6 | 1845– | 2s. 3d. |
| | B. Generalkaart over Jydland, . | 1:160,000 | 2·5 | 9 | 4 | 1880 | 1s. 5d. |
| | B. Generalkaart over Sjaeland, Moeen, Laaland og Falster, | 1:160,000 | 2·5 | 3 | 3 | 1869 | 2s. 3d. |
| | B. Generalkarte vom Königreich Dänemark mit Herzogtum Schleswig, . . . | 1:480,000 | 7·5 | 1 | 1 | 1846 | |
| | *C. Dänemark und seine Nebenländer. Von C. Vogel,* . . | 1:1,500,000 | 23·6 | 1 | 1 | 1890 | 8d. |
| **FRANCE.**[2] | A. Carte Topographique de la France (hypsometrical). Publiée par le Dépôt de la Guerre (only on German Frontier), . . . . . | 1:50,000 | 0·7 | 1092 | 71 | .. | 1s. 8d. |
| | A. Carte de la France de l'Etat-major. Publiée par le Dépôt de la Guerre. Edition Zinkographique, . . . | 1:80,000 | 1·2 | 937 (273) | 937 (273) | 1880 (1878-78) | 1s. 8d. |
| | A. Carte de la France. Dressée par le Service vicinal par ordre du Ministère de l'Intérieur, . . . . . | 1:100,000 | 1·5 | 596 | 372 | 1880– | 8d. |
| | B. Carte de la France. Dressée, gravée et publiée par le Service geographique de l'armée, . . . . . | 1:200,000 | 3·1 | 81 | 24 | 1883 | 1s. 8d. |
| | B. Carte de la France, . . . | 1:320,000 | 5·0 | 33 | 33 | 1852–83 | 1s. 8d. |
| | B. Carte de la France. Dressée au Dépôt des Fortifications (hypsometrical in colour), . | 1:500,000 | 7·8 | 15 | 15 | 1871 | 1s. 1d. |
| | *C. Karte von Frankreich. Von C. Vogel, with Index. Gotha: Justus Perthes,* . . . | 1:1,500,000 | 23·6 | 4 | 4 | 1889 | 6s. |
| | *C. Carte de France. Vivien de St. Martin. Paris: Hachette,* | 1:1,250,000 | 19·7 | 4 | 4 | 1884 | 12s. 6d. |
| | *C. Carte Spéciale des chemins de fer de la France. Publiée d'après les documents officiels par la Librairie Chaix, Paris* . . | 1:800,000 | 12·6 | .. | .. | .. | .. |
| | *C. Carte des chemins de fer, de la France. Paris: Andriveau-Goujon,* . . . . . | 1:1,390,000 | 21·9 | 6 | 6 | 1887 | 10s. |
| | *C. Carte physique et politique de la France. Par Naud-Evrard et Levasseur. Paris: Delagrave,* . . . . . | 1:800,000 | 12·6 | .. | .. | 1887 | 10s. 5d. |
| | *C. Carte physique et géographique de la France. Par R. Leuzinger. Zurich: Wuster & Co.,* . . . . . | 1:2,000,000 | 31·5 | 1 | 1 | 1885 | 1s. 8d. |
| **GERMAN EMPIRE.**[3] | A. Karte des Deutschen Reiches, Gradabteilungskarte (30′ long. 15′ lat.) Herausgegeben von den Generalstäben der Königreiche Preussen, Sachsen, Bayern und dem statistisch-topographischen Büreau des Königreichs Württemberg, . . . | 1:100,000 | 1·5 | 674 | 469 | 1878 | 1s. 6d. |
| | B. Uebersichtskarte von Südwestdeutschland bis zu den Alpen mit Teilen angrenzender Länder. Herausgegeben von dem K. Bayrischem Topographischem Büreau, . . | 1:250,000 | 3·9 | 24 | 24 | 1867 | 1s. 8d. |

[1] *Agent: G. E. C. Gad, Copenhagen.* [2] *Agent: Hachette and Cie., Paris.*
[3] *Agents: L. Schropp,* and *Eisenschmidt, Berlin.*

| Country. | Title of Map. | Scale. | | Sheets. | | Date. | Price per Sheet. |
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| | | Natural Scale. | Miles to Inch. | Total Number | Number Issued. | | |
| **German Empire** —*continued.* | *C. Karte des Deutschen Reiches. Von C. Vogel. With Index. Gotha: Justus Perthes,* | 1:1,500,000 | 23·6 | 4 | 4 | 1889 | 6s |
| | *C. Sachsen, Thüringen und benachbarte Länder von C. Vogel. Gotha: Justus Perthes,* | 1:925,000 | 14·5 | 1 | 1 | 1888 | 4 |
| | *B. Topographische Karte vom Thüringer Wald von C. Vogel. Gotha: Justus Perthes,* | 1:150,000 | 2·3 | 1 | 1 | 1880 | 3s. |
| | *A. Partie-Karten vom Thüringer Wald. Von Vogel, Fils und Kaupert. Gotha: Justus Perthes,* | 1:60,000 | 0·9 | 5 | 5 | 1880 | 1s. |
| ALSACE-LORRAINE. | *C. Uebersichtskarte der Eisenbahnen Deutschlands, bearbeitet im Reichseisenbahnamt. Berlin: Mittler & Sohn,* | 1:1,000,000 | 1·5 | 4 | 4 | 1889 | 5s. |
| | *B. Special-karte des deutschen Reichslandes Elsass-Lothringen Von H. Kiepert. Berlin: D. Reimer.* | 1:250,000 | 3·9 | 4 | 4 | 1888 | 8s. & 12s. |
| ,, | A. Provisorische Karte von Elsass-Lothringen. Die einzelnen Sektionen werden nach Massgabe des Erscheinens der entsprechenden Blätter der Karte des Deutschen Reiches aus dem Handel gezogen | (1:100,000) 1:80,000 | 1·2 | 38 | 38 | 1871–78 | 6d. |
| BADEN. | A. Topographische Karte vom Grossherzogtum Baden. Herausgegeben vom Grossherzogl. Milit. Topogr. Büreau. Neuausgabe erscheint seit 1876 seitens der Königl. preuss. Landesaufnahme, | 1:50,000 | 0·7 | 55 | 55 | 1838–49 | 2s. |
| ,, | A. Neue topopographische Karte vom Grossherzogtum Baden. Gradabteilungskarte (10′ long. 6′ lat.) Bearbeitet vom Grossherzogl. badischen topographischen Büreau der Oberdirektion des Wasser- und Strassenbaues (Handelsministerium), | 1:25,000 | 0·3 | 170 | 170 | 1876–89 | 3s. 4s. 6d. |
| ,, | B. Uebersichtskarte von Baden. Herausgegeben vom Grossherzogl. Milit. Topogr. Büreau. | 1:200,000 | 3·1 | 6 | 6 | 1855–64 | 1s. 4d. |
| ,, | B. Generalkarte von Baden. Herausgegeben vom Grossherzogl. Milit. - Topogr. Büreau, | 1:400,000 | 6·1 | 1 | 1 | 1868 | 4s. |
| BAVARIA.[1] | A. Positionskarte von Bayern. Herausgegeben vom Milit.-Topogr. Büreau des Königl. Bayrischen Generalstabes, | 1:25,000 | 0·3 | 990 | 225 | 1875 | 1s. 0½d. |
| ,, | A. Topographischer Atlas von Bayern (Bayrische Generalstabskarte) Seit 1854 in Neubearbeitung, | 1:50,000 | 0·7 | 112 | 112 | 1812–67 | 3s. & 4s. 2d. |
| ,, | A. Karte des Deutschen Reiches. Anteil Bayerns. Herausgegeben vom Königl. Bayr. topograph. Büreau, | 1:100,000 | 1·5 | 80 | 21 | 1878 | 1s. 6d. |
| HESSE. | B. Karte vom Grossherzogtum Hessen und den angrenzenden Ländern. Herausgegeben vom Grossherzogl. Generalquartiermeisterstab, | 1:250,000 | 3·9 | 2 | 2 | 1867 | 5s. |
| ,, | B. Höhenschichtenkarte des Grossherzogtums Hessen und der angrenzenden Länder, | 1:250,000 | 3·9 | 2 | 2 | 1874 | 6s. |

[1] *Agent: Literar. Artist. Anstalt, Munich.*

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| | | Natural Scale. | Miles to Inch. | Total Number | Number Issued. | | |
| **German Empire** —*continued.* | | | | | | | |
| LIPPE. | A. Karte vom Fürstentum Lippe. Herausgegeben von der Fürstl. Lippeschen Regierung, . . . . | 1:80,000 | 1·2 | 1 | 1 | 1887 | 3s. |
| OLDENBURG. | A. Topographische Karte des Grossherzogtums Oldenburg | 1:50,000 | 0·7 | 16 | 16 | 1856–63 | 6s. |
| | B. Generalkarte von dem Grossherzogtum Oldenburg, . | 1:200,000 | 3·1 | 1 | 1 | 1879 | 3s. |
| PRUSSIA. | A. Messtischblätter vom Preussischen Staate mit Einschluss der Thüringischen Staaten, Anhaltischen und Braunschweigischen Lande, Hessen und Elsass-Lothringen, . . . . . | 1:25,000 | 0·3 | 3698 | 1699 | 1868 | 1s. |
| ,, | A. Topographische Karte der Provinz Hannover, des Herzogtums Braunschweig (Papensche Karte) Neuausgabe 1869, . . . . | 1:100,000 | 1·5 | 66 | 66 | 1832–47 | 1s. 6d. |
| ,, | A. Generalstabskarte von Rheinland und Westfalen, nebst Birkenfeld. Verschwindet nach Herstellung der deutscher Einheitskarte, . . | 1:80,000 | 1·2 | 72 | 72 | 1841–45 | 1s. 6d. |
| ,, | A. Karte von Hohenzollern. Gradabteilungskarte (20′ long. 12′ lat.), . . . . | 1:50,000 | 0·7 | 9 | 9 | 1863 | 1s. 6d. |
| ,, | A. Karte des Deutschen Reiches. Anteil Preussens. Bearbeitet von der Königl. Preussischen Landes aufnahme, . . | 1:100,000 | 1·5 | 544 | 423 | 1878 | 1s. 6d. |
| ,, | *B. Karte der Rheinprovinz und der Provinz Westfalen. Von W. Liebenow. Berlin: Berliner Lithogr. Institut,* . . . | 1:240,000 | 3·7 | 6 | 6 | 1888 | 1s. 6d. |
| | B. Uebersichtskarte der Verwaltungsbezirke der Königl. Preuss. Eisenbahndirektionen, etc. Berlin: Shropp, | 1:600,000 | 9·4 | 9 | 9 | 1883 | 2s. 6d. |
| SAXONY.[1] | A. Topographische Spezialkarte des Königreichs Sachsen. Bearbeitet vom topographischen Büreau des Königl. Sächs. Generalstabes, . | 1:25,000 | 0·3 | 156 | 156 | 1875 | 1s. 6d. |
| | A. Topographischer Atlas des Königreichs-Sachen. Herausgegeben von der Königl. Sächs. Plankammer, . | 1:57,600 | 0·9 | 22 | 22 | 1837–60 76 | |
| | A. Topographische Karte des Königreichs Sachsen. Gradabteilungskarte (30′ long. 15′ lat.). Anteil Sachsens an der Karte des Deutschen Reiches, . . . . . | 1:100,000 | 1·5 | 30 | 19 | 1863–68–1878 | 1s. to 2s. |
| | *B. Karte des Königreichs Sachsen von Th. von Bomsdorff. Leipzig: Hinrichs,* . . | 1:200,000 | 3·1 | 4 | 4 | 1887 | 4s. to 6s. |
| WURTEMBERG.[2] | A. Topographischer Atlas von Württemberg. Herausgegeben vom Königl. Württemb. Landesamt, . . . . | 1:50,000 | 0·7 | 55 | 55 | 1829–51 1878–82 | 1s.–1s. 6d. |
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| | B. Generalkarte des Königreichs Württemberg nebst angrenzenden Ländergebieten, . | 1:200,000 | 3·1 | 6 | 2 | 1885 | 2s. 6d. |
| | B. Karte des Königreichs Württemberg, . . . . . | 1:400,000 | 6·3 | 1 | 1 | 1884–85 | 2s. |

[1] *Agents: W. Engelmann, C. Hinrichs.*

[2] *Agent: W. Kohlhammer, Stuttgart.*

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| **ITALY.**[1] | A. Tavolette rilevate, | 1:25,000 and 1:50,000 | 0·3 / 0·7 | 277 Sect. à 16 / do. 4. | 220 / 340 | 1873 | 1s. 8d. |
| | A. Carta del Regno d'Italia, | 1:100,000 | 1·5 | 277 | 132 | 1873 | 1s. 5d. |
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| | C. Carta d'Italia, | 1:800,000 | 12·3 | 6 | 6 | 1885 | 1s. 3d. |
| | C. Carta d'Italia, | 1:1,000,000 | 15.7 | 6 | 6 | 1885 | 1s. 8d. |
| | *A. Carta topografica del Gran Sasso d'Italia, Club Alpino Italiano,* | 1:80,000 | 1·2 | 1 | 1 | 1887 | |
| | *C. Karte von Italien Von C. Vogel, with Index. Gotha: Justus Perthes,* | 1:1,500,000 | 23·6 | 4 | 4 | 1889 | 6s. |
| | *Carta Altimetrica et Batometrica dell' Italia, construtta e disegnata da Guido Cora. Turin: Guido Cora,* | 1:2,000,000 | 31·5 | 1 | 1 | 1889 | 2s. 6d. |
| | *C. Special-karte von Mittel-Italien mit Berücksichtigung des Alterthums. Von H. Kiepert. Berlin: D. Reimer,* | 1:1,250,000 | 19·7 | 4 | | 1881 | 10s. |
| | *C. Neue General-karte von Unter-Italien. Von H. Kiepert. Berlin: D. Reimer,* | 1:800,000 | 12·6 | 2 | 2 | 1882 | 6s. |
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| | A. Topographische en Militaire Kaart van het Koningrijk Nederlanden, | 1:50,000 | 0·3 | 62 | 62 | 1850–64 | 4s. 6d. |
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| | *B. Kaart van het Koningrijk der Nederlanden. Naar de Topografische kaart. De E. Geest Amsterdam: Seijffardt,* | 1:300,000 | 4·7 | 3 | 3 | 1888 | 5s. 4d. |
| | *B. Kaart van het Koningrijk der Nederlanden. Hague: Smulders* | 1:400,000 | 6·3 | 1 | 1 | 1887 | 7s. |
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| | A. Carte du Grand-Duché de Luxembourg, | 1:90,000 | 1·4 | 4 | 4 | 1861 | |
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| | B. Amtskarter, | 1:200,000 | 3·1 | | 32 | 1826 | 1s. 8d. |
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| | *B. Lomme Reisekart over Norge. Udarbeidet af Oskar Nielsen. Kristiania: Cammermeyer,* | 1:400,000 | 6·3 | 18 | 10 | 1869 | 4d. |
| | *C. Veikart over Norge, Udarbeidet af S. Waligorski og N. Wergeland,* | 1:700,000 | 11·0 | 2 | 2 | 1889 | 3s. 6d. |
| | *C. Veikart over Norge af P. A. Munch,* | 1:70,000 | 11·0 | 4 | 4 | 1889 | 17 sh. |

[1] *Agent: Instit. topogr. milit., Florence.* [2] *Agent: A. Nijhoff, Amsterdam.*
[3] *Agent: Geogr. Opmaaling, Christiania.*

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| **PORTUGAL.** | A. Carta chorographica dos Reinos de Portugal e Algarve, | 1:100,000 | 1·5 | 37 | 23 | 1856 | 1s. |
| | B. Carta geographica de Portugal. Publicado por Ordem de Sua Magestade, | 1:500,000 | 7·8 | 1 | 1 | 1860-70 | 4s. |
| | *C. Karte von Spanien und Portugal. Von C. Vogel. With Index,* | 1:1,500,000 | 23·6 | 4 | 4 | 1890 | 6s. |
| | *C. Vidal's Map of Portugal,* | 1:570,240 | 9·0 | 2 | 2 | 1889 | 17 sh. |
| | *C. Mapa general de la Peninsula Iberica, Islas Baleares, Canarias y Posesiones Espanolas,* | 1:750,000 | 11·8 | 8 | 8 | 1882 | 12s. 6d. |
| **RUSSIA.** | B. Topographical Map of Russia (3 verst), in Russ., | 1:126,000 | 1·9 | 792 | 491 | 1857- | 3s. 2d. |
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| | C. Military Road-Map of Russia in Europe, in Russ., | 1:1,050,000 | 16·5 | 16 | 16 | 1871 | 1s.[2] |
| | C. Oro-hydrographical Map of Russia in Europe, in Russ., | 1:2,520,000 | 39·7 | 6 | 6 | 1885 | 8s. |
| | *C. Karte von Ost-Europa. Von A. Petermann. Stieler's Hand-Atlas,* | 1:3,700,000 | 58·3 | 6 | 6 | 1889 | 8d. |
| | *C. Generalkarte des Russischen Reiches in Europa. Von H. Kiepert,* | 1:3,000,000 | 47·3 | 6 | 6 | 1882 | 10s. |
| | *C. Uebersichtskarte vom Westlichen Russland. Von O'Gready. Kassel: Fischer,* | 1:1,750,000 | 27·6 | 4 | 4 | 1888 | 1s. |
| | *C. General und Strassenkarte von West-Russland. Von G. Freitag. Wien: Artaria & Co.,* | 1:1,500,000 | 23·6 | 6 | 6 | 1888 | 2s. 6d. |
| | C. Hypsometrical Map of Russia in E. (in Russ). By A. Tillo, | 1:2,520,000 | 39·7 | 8 | 8 | 1888 | 2s. 6d. |
| **SPAIN.**[1] | A. Mapa topographico de España bajo la direction de C. Ibañez de Ibero, | 1:50,000 | 0·7 | 1080 | 55 | 1875 | 6s. 3d. |
| | B.‖F. Coëllo: Atlas de España y sus Posesiones de Ultramar, | 1:200,000 | 3·1 | 60 | 45 | 1848 | 5s. |
| | B. Mapa itinerario militar de España, | 1:500,000 | 7·8 | 20 | 20 | 1866 | £4, 3s. 4d. |
| | C. Mapa de España de C. Ibañez de Ibero, | 1:1,500,000 | 23·6 | 1 | 1 | 1884 | 4s. 2d. |
| | *C. Karte von Spanien und Portugal. Von C. Vogel. With Index,* | 1:1,500,000 | 23·6 | 4 | 4 | 1890 | 6s. |
| **SWEDEN.**[2] | A. Generalstabens Karta öfver Sverige, | 1:100,000 | 1·5 | 234 | 70 | 1821 | 2s. 3d. |
| | B. Höjdkarta öfver södra och mellersta Sverige, | 1:500,000 | 7·8 | 10 | 10 | 1886 | 2s. 3d. |
| | B. Karta öfver Sverige, | 1:500,000 | 7·8 | 15 | 15 | 1887 | 2s. 3d. |
| | B. Karta öfver Stockholms Lan., | 1:200,000 | 3·1 | 2 | 2 | 1886 | 2s. 3d. |
| | C. Postkarta, | 1:800,000 | 12·6 | 4 | 4 | 1887 | 16s. 7d. |
| | C. Generalkarta öfver Sverige, | 1:1,000,000 | 15·7 | 3 | 3 | 1865 | 10s. 5d. |
| | *C. Karte von Ost-Europa. Von. A. Petermann. See Russia,* | 1:3,700,000 | 58·3 | | 6 | 1889 | 8d. |
| | *C. Karta öfver Sverige, Norge, Danmark, och Finland. Af. C. Kjellström. Stockholm: G. Beijers,* | 1:2,000,000 | 31·5 | | 2 | 1888 | 3s. 6d. |
| | *C. General Karta öfver Sverige, Norge och Danmark, etc. Stockholm: Hahr,* | 1:1,000,000 | 15·7 | 4 | 4 | 1887 | 21s. |
| **SWITZERLAND.** | A. Topographischer Atlas der Schweiz (Siegfried-Atlas) Blätter aus dem Flach und Hügelland 1:25,000, aus dem Gebirgslande 1:50,000, | 1:25,000 | 0·3 | 440 | 552 | 401 | 1870 | 1s. |
| | | 1:50,000 | 0·7 | 112 | | | |

[1] *Agent: Inst. Geogr. y estad, Madrid.* [2] *Agents: Bonnier. Generalstat litogr. Anstalt, Stockholm.*

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| **Switzerland**[1]—*continued.* | A. Topographische Karte der Schweiz (Dufour-Karte), | 1:100,000 | 1·5 | 25 | 25 | 1842-65 | 1s.—2s. |
| | B. General-karte der Schweiz, | 1:250,000 | 3·9 | 6 | 6 | 1867-73 | 2s. |
| | B. Gesammtkarte der Schweiz, | 1:500,000 | 7·8 | 1 | 1 | 1881 | 1s. 6d. |
| | *C. Südwest-Deutschland und die Schweiz von C. Vogel. Gotha: Justus Perthes,* | 1:925,000 | 14·5 | 2 | 2 | 1888 | 8d. |
| | *B. Karte des Berner Oberlandes von R. Leuzinger. Bern: Schmid, Francke, & Co.,* | 1:200,000 | 3·1 | 1 | 1 | 1887 | 1/6—3/2 |
| | *B. Neue Karte der Schweiz von R. Leuzinger. Bern: Schmid, Francke & Co.,* | 1:400,000 | 6·3 | 1 | 1 | 1887 | 4/—6/4 |
| | *B. Physikalische Touristenkarte der Schweiz von R. Leuzinger. Bern: Schmid, Francke & Co.,* | 1:500,000 | 7·8 | 1 | 1 | 1882 | 4s. 6d. |
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| | *B. Karte der Schweiz von J. M. Ziegler. Zürich: Wuster & Co.,* | 1:380,000 | 5·9 | 1 | 1 | 1885 | 10s. |
| | *B. Touristenkarte der Central-Schweiz von J. v. Tschudi. St. Gallen: Scheitlin & Zollikofer,* | 1:250,000 | 3·9 | 1 | 1 | 1887 | 2/8—4/ |
| **ALPS.** | *B. The enlarged Alpine Club Map of Switzerland,* | 1:190,080 | 3·0 | 8 | 8 | 1889 | 1s. 6d. |
| | *B. The Alpine Club Map of Switzerland,* | 1:250,000 | 3·9 | 4 | 4 | 1889 | 12s. |
| | *B. Karte der Ost-Alpen von L. Ravenstein. Frankfurt a/M.,* | 1:250,000 | 3·9 | 9 | 5 | 1882 | 5s.—6s. |
| | *B. Atlas der Alpenländer und von Mittel-Italien von J. G. Mayr. Gotha: Justus Perthes,* | 1:450,000 | 7·1 | 11 | 11 | 1884 | 2/6—3/6 |
| | *B. Touristenkarten der Oesterr.-Salzburger- und Tyroler-Alpen von R. Maschek. Wien: Artaria & Co.,* | 1:129,600 | 2·0 | 11 | 11 | 1882 | 2s.—2s.8d. |
| | *B. Karte der Alpen von Prof. Dr. H. Berghaus (J. G. Mayr). Daraus einzeln: 1. Die Schweizer Alpen* (4 Blatt). *2. Die Ost-Alpen* (4 Blatt). *Gotha: Justus Perthes,* | 1:450,000 | 7·1 | 8 | 8 | 1884 | 10s. |
| | *C. Karte der Alpen vom Bodensee bis Wien und Triest von H. Petters & A. Waltenberger. Augsburg: Lumperts Alpiner Verlag,* | 1:860,000 | 13·5 | 1 | 1 | 1882 | 3s.—4s. |
| | *C. Alpenkarte von Tyrol mit den Angrenzenden Theilen von Bayern, Salzburg, Steiermark, Kärnten, Krain, Ober-Italien und der Schweiz von Ch. Michel. München: Finsterlein,* | 1:600,000 | 9·4 | 2 | | 1888 | 3s. |
| | *B. Karte des Alpenlandes von Randegger. Orohydrographische und Politische Ausgabe. Zürich: Wuster & Co.,* | 1:500,000 | 7·8 | 9 | 9 | | 19s.—25s. |
| | *C. Uebersichtskarte der Alpenländer. Von V. v. Haardt. Wien: Ed. Hölzel,* | 1:1,000,000 | 15·7 | 2 | 2 | 1889 | 6s. 3d. |
| | *B. Relief-Reisekarte von Nord-Tirol, Salzburg und den angrenzenden Gebieten. Von R. Leuzinger. Augsburg: Lampart,* | 1:500,000 | 7·8 | 1 | 1 | 1889 | |

[1] *Agent: Schmidt, Frank and Cie., Bern.*

# MAP PROJECTIONS.

By W. A. Taylor, M.A.

The representation of the Earth's surface, or portions of it, in the convenient form of maps, is of such importance to the study of geography that the processes by which it is accomplished must interest all who devote their time and attention to this science. And yet, few who are constantly handling maps have any knowledge of their construction. We propose, therefore, in this article to give a brief, and if possible clear, exposition of the principal forms of projection employed, showing the errors to which each is liable. Some mathematical calculations are unavoidable, but they will be confined within the closest possible limits, and numerical examples will be given to enable the reader who is not versed in mathematics to judge of the advantages and disadvantages of each method.

Of course the difficulties that cartographers have to contend with arise from the fact that a spherical surface cannot be spread out unbroken on to a flat surface. If any portion of a very thin spherical shell be laid on a table and pressed out equally in all directions from the point of contact, it will split up into an infinite number of exceedingly narrow triangles having their vertices at the given point. Or if, again, a given line on the spherical surface be forced down gradually on to the table, the other parts being at the same time smoothed out on either side, the triangles will be opposite one another with their bases on the given line. Now we can imagine these triangles stretched until they meet, or forced together to form a continuous whole, but in the former case a considerable augmentation of the total area will be the result, while in the latter the outer parts will be distorted. Lastly, we may place the circular edge of the spherical shell on the table and press down the inner parts until they lie flat upon it, but in this case there will be a diminution of area towards the centre. Many forms of projection have been devised to remove or minimise one of these errors—distortion and disproportion of areas—or to obtain a fairly good representation of portions of the Earth's surface by reducing both. In choosing a projection regard must be had to the purpose for which the map is intended, and to the area it is to represent, the errors inherent in a form of projection being, perhaps, imperceptible in a map of France or of a country situated near the equator, whereas they would be fatal to its use for a map of Asia or Spitzbergen. In a map of the world, which is chiefly intended to give a notion of the outlines of land and water, equivalence of area is of less importance than absence of distortion. Now there are two projections, the Stereographic and Mercator's, in which there is absolutely no distortion. In the former two points are taken, one at either extremity of a diameter of a sphere, and a plane bisecting this diameter at right angles, and then lines are drawn from one of these points to the surface of the opposite hemisphere. The points where these lines meet the plane will correspond on the map to the points where they meet the sphere. This class of projections is called Per-

SPECTIVE, because the contour lines on the sphere are represented as they would be seen by the eye placed at the centre from which the lines are drawn. Let $P$ be any point on the sphere (Fig. 1.), $ACPB$ a section through the fixed diameter $AB$ and $P$, $D$ the centre of the circle, and $\theta$ the angle $PDB$. If $AP$ meets the plane $CD$, at right angles to $AB$, in the point $p$, $p$ is the point on the plane of the map corresponding to $P$. Now the angle which the tangent plane at $P$ makes with $AP$ = the complement of the angle $APD$ = the complement of the angle $pAD$ = the angle $ApD$, between the plane $CD$ and $AP$. Hence, if a small cone be described round $AP$, the element of surface which it cuts off from the tangent plane, and which is ultimately equal and similar to the element cut off from the surface of the sphere, is similar to the figure described on the plane $CD$, and therefore there is no distortion. The area at $p$ is to the area at $P :: Ap^2 : AP^2 = \sec^2 \frac{\theta}{2} : 4 \cos^2 \frac{\theta}{2} = 1 : 4 \cos^4 \frac{\theta}{2}$.

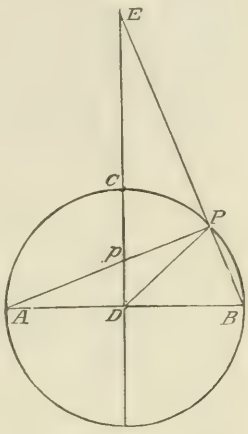

Fig. 1.

Hence at the centre $D$ the area is one-fourth of the area on the sphere, while at $C$ those areas are equal, as may also be seen from the fact that, when $AP$ moves up to $C$, it cuts the plane $CD$ and the tangent plane at $C$ at equal angles. Thus, the same spherical area is represented four times as large at the periphery of the map as at the centre. The distance, $r$, of any point $p$ on the projection from $D$ equals $\tan \frac{\theta}{2}$, the radius of the sphere being taken as unity. It may easily be seen that all great circles passing through $B$ are projected into straight lines through $D$, and that all circles in planes parallel to the plane of projection are represented by circles having their centres in $D$, and that, consequently, if $B$ be a Pole, the meridians are straight lines at equal angular distances, and the parallels of latitude concentric circles. In this case $r = \tan \frac{\theta}{2}$ may be written $r = \tan \left(\frac{\pi}{4} - \frac{l}{2}\right)$, where $l$ is the latitude. But, further, if $B$ be any other point on the sphere, the meridians and parallels will also be projected into arcs of circles, for it has already been shown that the tangent plane at any point is equally inclined with the plane of projection to the line drawn from $A$ to that point, and any circle of which the point in question is the pole, will lie in a plane parallel to the tangent plane, and will therefore be projected into a circle. If $C$ be a Pole, and $BP$ be produced to meet $DE$ produced in $E$, $pE$ will be the diameter of the projection of the parallel at $P$. And $ED = DB \tan DBE$, or $\cot \frac{\theta}{2}$. But $pD = \tan \frac{\theta}{2}$; $\therefore$ $pE = 2 \cot \theta$, and the radius of the arc of latitude $= \cot \theta$. The radius of the meridional arcs may be found in the same way. When the centre $B$ is neither a Pole nor a point on the equator, the projection is distinguished by the additional epithet of HORIZONTAL, as it may be constructed by projecting the sphere on to the plane of the horizon of $B$.

Another form of projection, the ORTHOGRAPHIC, is obtained by removing the point of sight to an infinite distance, whereby the lines of projection are placed perpendicularly to the plane *CD*. This produces a map in which the areas become, at the edge, infinitely small and the distortion infinitely great, and therefore this method is most suitable for maps of the Moon. But, by choosing a point beyond the surface of the sphere, the exaggeration of areas which takes place in the Stereographic projection may be diminished, and, likewise, the distortion of the Orthographic considerably reduced. To this method the name GLOBULAR is given.

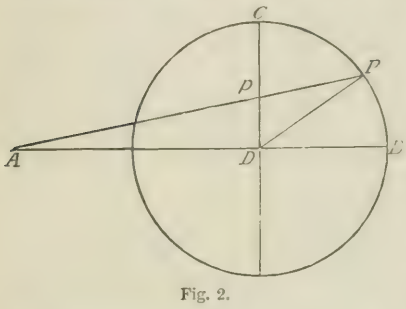

Fig. 2.

Changing the former figure by placing $A$ on the diameter produced (Fig. 2), and putting $d$ for the ratio $AD : DB$, we find that the ratio of the projection of an elementary area at $P$ to the area itself is $d^2\ (d\ \cos\ \theta + 1) : (d + \cos\ \theta)^3$, which becomes at $C$, $1 : d$, and at $D$, $d^2 : (d+1)^2$. Therefore the ratio which indicates the maximum exaggeration of areas is $\overline{d+1}^2 : d^3$. The distance of $A$ from the circumference of the circle is often fixed at sin 45° × radius, in which case $d$ becomes $1 + \frac{1}{\sqrt{2}}$, and the above ratio is, roughly, 3 : 2. It may be well to notice here that a more or less exact equivalence of area at any corresponding parts of the sphere and projection has no connection with the accuracy of the map, but that the true measure of accuracy is the ratio of areas on the map corresponding to equal areas on the Earth's surface. For instance, if a square mile of country be represented by 3 square inches in one part of a map, and by 2 square inches in another, it is quite immaterial whether it be represented by 3, 2, or any other number of square inches on the sphere from which the map is calculated. Returning to the Globular projection, we will proceed to consider the distortion. It may be ascertained that a small square on the sphere, having its sides respectively parallel and perpendicular to an arc drawn from $B$ to the periphery of the hemisphere is projected into a rectangle whose sides are to one another as $d + \cos\ \theta : d\ \cos\ \theta + 1$, which at the periphery becomes $d : 1$. Taking $A$ at the same point as in the former example, this ratio becomes about 12 : 7. $Dp$ will be found to be $\frac{d \sin \theta}{d + \cos \theta}$, or $\frac{(1+\sqrt{2}) \sin \theta}{1 + \sqrt{2} + \sqrt{2} \cos \theta}$, when $d = 1 + \frac{1}{\sqrt{2}}$. The meridians and parallels of latitude will evidently become ellipses, cutting the equator and central meridian respectively at a distance from the centre equal to $\frac{(1+\sqrt{2}) \sin \theta}{1+\sqrt{2}+\sqrt{2} \cos \theta}$, $\theta$ being then the longitude or latitude as the case may be. But when $d = 1 + \frac{1}{\sqrt{2}}$, these elliptic arcs approximate very closely to circular arcs, cutting the above lines at equal distances, and therefore the usual mode of construction is to divide the equator and central meridian into equal parts, and draw arcs of circles through the points of division. The projection is

then said to be equidistant. Professor Nell modified this projection by drawing the meridians and circles of latitude at equal distances from those of the equidistant and stereographical circles. Since the exaggeration of areas diminishes as $d$ increases, and the distortion varies with $d$, the latter error will be reduced at the expense of an increase in the former.

Another large class of projections comprises those in which the surface of the sphere is projected on to a cylinder touching the sphere along the equator. This cylinder, when unrolled, becomes a plane. In the accompanying figure $AB\ P$ is a section of the sphere through the axis, $AB$ the intersection of the plane of the equator, and $pB$ of the cylinder. Let $l$ be the latitude of any point, $P$, on the sphere, $\lambda$ its longitude, and $y$, $x$ the co-ordinates of the corresponding point, $p$, on the projection. In the simple cylindrical projection $CP$ produced meets $pB$ at $p$. Now we see that $y\ (pB) = \tan l$. Therefore $dy = \sec^2 l dl$. And the length of an infinitely small arc measured along the parallel at $P$ is, in the projection, increased in the ratio $Cp : CP = Cp : CB = \sec l : 1$. Therefore the area varies as $\sec^3 l$, and the distortion as $\sec l$.

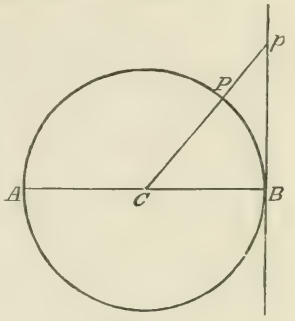

Fig. 3.

It is evident that, as we approach the poles, these errors increase indefinitely, or, in other words, that the map will have no limits in these directions. The projection is, therefore, often extended only to the 45th parallel, the higher latitudes being projected on to the tangent planes at the Poles. This is known as the CUBICAL PROJECTION. The Rev. JAMES GALL'S PROJECTION is another modification, of which he gave an account in the *Scottish Geog. Magazine*, vol. i. p. 119. The construction is as follows :—A cylinder is described cutting the sphere at the 45th parallels of north and south latitude (Fig. 4). Let $DE$ be the section of this cylinder. Join $AP$ and produce this line to meet $DE$ in $p$. Then $pE = AE \tan PAB = (1 + \cos 45°) \tan \frac{l}{2}$. Now the arc of longitude at $E$ is less than at $B$ in the ratio $\cos 45° : 1$. Hence, if a degree of longitude on the projection be the standard of measurement, we have $y = (1 + \cos 45°) \tan \frac{l}{2} \times \sec 45° = (1 + \sec 45°) \tan \frac{l}{2}$. The same result may be obtained by drawing the line $Cp$ and producing it to meet the circumscribing cylinder in $p_1$. The point $A$ is moveable, being always opposite to the meridian projected, so that this projection is not stereographic in the strict sense of the term. When $l$ is 90°, $y = 1 + \sec 45° = 1 + \sqrt{2}$, wherefore this projection has an advantage over the ordinary cylindrical projection and over Mercator's, in being limited towards the poles. Now $dy = \frac{1 + \sec 45°}{2} \sec^2 \frac{l}{2}\, dl$,

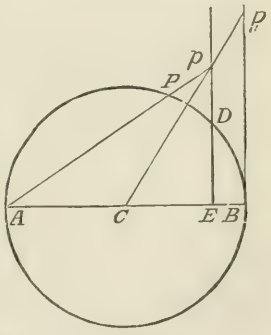

Fig. 4.

and $dx$ = diff. of parallel × sec $l$. Therefore the ratio of area is $\sec^2 \frac{l}{2}$ sec $l$ : 1, or 2 : cos $l$ (1 + cos $l$). The areas at 80° of latitude are therefore less than 10 times, whereas in the ordinary cylindrical projection they are over 190 times, the true proportion, so that the latter is quite useless for high latitudes. The distortion, however, in Gall's Projection, though it vanishes at 45°, is about 5 : 14 at 80°, rendering it in this respect inferior to Mercator's, which we shall now describe.

This is not a projection in the strict sense of the term, that is, it is not constructed by lines drawn according to a fixed law from a particular point or line. The principle on which it is based is that each element of latitude is increased in the same ratio as the longitude. In cylindrical projections the distance between the meridians is at all points the same as the distance at the Equator, whereas on a sphere it varies with the cosine of the latitude. Hence, at latitude $l$ this distance is equal to sec $l$ × the arc on the sphere. Accordingly, in MERCATOR'S PROJECTION $dy$ is made equal to sec $l dl$, the integral of which in its most convenient form is $-\log_e \tan\left(\frac{\pi}{4} - \frac{l}{2}\right)$. There is, then, no distortion, but the areas are exaggerated in the ratio $\sec^2 l$ : 1, which at 80° becomes rather greater than 33 : 1. Besides correctness of outline, Mercator's projection has another great advantage. Ships used always to sail along a rhumb or loxodrome, which is a curve making the same angle with every meridian. The meridians in Mercator's projection being parallel, a straight line joining two points cuts them at the same angle, and, as the longitude and latitude at every point are increased in the same proportion, the angle this line makes with the meridians is the angle the loxodrome makes with the meridians on the sphere. Thus all the navigator has to do is to join the two ports between which he is sailing by a straight line, and all his bearings can then be read on the map. The shortest way, however, between two points is not the loxodromic line, but the arc of the great circle passing through them, and of late years great circle-sailing has come much more into vogue. In latitudes more than 20 or 30 degrees from the equator the loxodrome of Mercator's chart diverges considerably from the great circle, and, therefore, some other kind of chart is necessary. Such is that constructed by the GNOMONIC or CENTRAL PROJECTION, in which the centre of the sphere is the point from which the lines of projection are drawn, and the plane on which the projection is made is perpendicular to the plane of the equator. Great circles are those which have their centre at the centre of the sphere, and therefore all lines drawn from the centre to the circumference lie in the plane of the circle. But the intersection of two planes is a straight line, and therefore all great circles are represented in this projection by straight lines. The areas are greatly exaggerated as we depart from the perpendicular on the plane from the centre, and distortion also becomes very prominent, but these errors need not be discussed in a chart of such usefulness for the particular purpose for which it is intended. The following figures, which give on the same scale the distances of the 80th parallel from the equator in the cylindrical projections, will give an idea of their relative extension :—Cylindrical, 5·67; Gall's, 2·63; Mercator's, 2·44. The length of

the meridional arc on the sphere is nearly 1·4. At 60° Gall's areas are to those on the Equator as 8 : 3 and Mercator's as 4 : 1.

The EQUIDISTANT CYLINDRICAL PROJECTION perhaps deserves mention as being an easy method. The degrees of latitude are marked off at equal distances on the meridians, on the same scale as the longitude, so that the network is formed of square meshes. As in Gall's projection, countries towards the Poles are extended parallel to the Equator but in a greater ratio, namely, sec $l$ : 1. By making the projection on the cylinder through the 45th parallels, the distortion is destroyed at 45 . and at other points is reduced to $\frac{\sec l}{\sqrt{2}}$ : 1.

We shall now proceed to describe those projections which, though sometimes extended ever the whole surface of the sphere, are better adapted for the representation of limited areas. Seeing that the errors inseparable from projections become more pronounced as the delineation proceeds from the centre or central line of projection, it is advisable to place this centre or central line in the middle of the portion chosen for representation. For instance, as Europe extends a little beyond the 70th parallel northwards and nearly to the 35th southwards, the 50th or 55th parallel might be taken as the central line. The map may then be developed by some form of the CONICAL PROJECTION. In the simplest form, ascribed to Ptolemy, a cone is supposed to touch the sphere along the central parallel. Suppose $PBD$ (Fig. 5) to be a section of the sphere, $DB$ the plane of the equator, $P$ a point on the central parallel. Then if the tangent $PC$ meets the axis of the sphere produced in $C$, $C$ is the apex of the cone, and $CP = \cot l$, $l$ being, as before, the latitude of $P$. The map is then constructed by drawing a straight line to represent the central meridian, and on this a point is marked for the intersection of the central parallel. From this point a distance equal to cot $l$ is measured off, and, with this as radius, a circle is described passing through the intersection of the central meridian and parallel. Thus the central parallel is drawn. Let $Q$ be the point where another parallel cuts the plane $PBD$. Make $Pq$ equal to $PQ$ and, with the same centre as before and radius $Cq$, describe a circle. In this way all the other parallels are drawn. The length of the arcs of longitude are marked off along the central parallel, and the meridians are formed by drawing lines through these points and the centre of the parallel arcs. Thus fan-shaped network is produced, out of which a rectangular map may be cut. Along the central parallel the areas will be equal to those on the sphere, for here the cone touches the sphere, but on either side of this line they will be exaggerated, since the cone is external to the sphere. This exaggeration, however, is small compared with this error in the forms of projection we have already described. For instance, if the 45th parallel be the initial line, the areas between 59° and 60° are increased by about 4 per cent. Mercator obtained greater

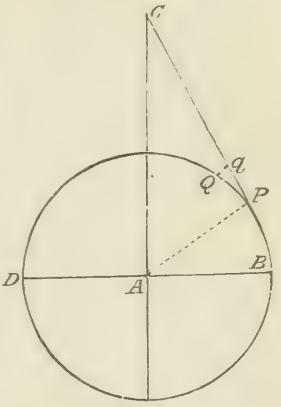

Fig. 5.

accuracy by making the cone cut the sphere at two parallels of latitude, these being chosen so as to divide the map into equal parts. Another modification is the polyconical, in which each parallel of latitude has its separate centre and radius. The RECTANGULAR TANGENTIAL PROJECTION used in the Topographical Department of the War Office, is of this kind.

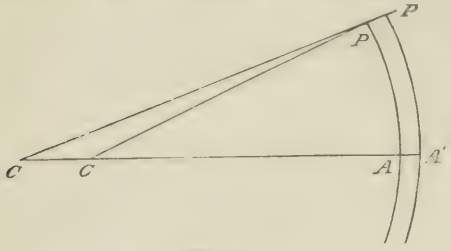

Fig. 6.

$C'A'$ is the central meridian, $CP$, $CPP'$ radii drawn to two adjacent parallel arcs $AP$ and $A'P'$ (Fig. 6). Then it may be shown that $\tan\theta = w\cos u$, where $2\theta$ is the angle $PCA$, $u$ the co-latitude of $P$ and $2w$ the angular distance, measured along the Equator, between the central meridian and the point where the curve represented by the equation meets the Equator. This curve, being the limit of $P'P$ and the other chords similarly constructed, will meet the parallels at right angles, as the meridians actually do on the sphere. The theory of this projection is too abstruse to be introduced into this article, but may be studied by any one who desires to know more about it in the *Journal of the Royal Geographical Society*, vol. xxx. (1860), p. 106. It will suffice here to describe the mode of finding the points of intersection of the parallels and meridians. Let $BCD$ (Fig. 7) be any parallel of latitude, $A$ its centre, and $AC$ the central meridian. To find where any other meridian cuts $BCD$, mark off on the tangent a length $CE$ equal to half the distance of this meridian on the sphere from the central meridian, this distance being measured along the parallel corresponding to $BCD$, and from $E$ draw $EB$ to touch $BCD$ at $B$. Then $B$ will be the point required. Since, however, the radius $AC$ is always of considerable length, it is more convenient to calculate the co-ordinates $CF$ and $BF$.

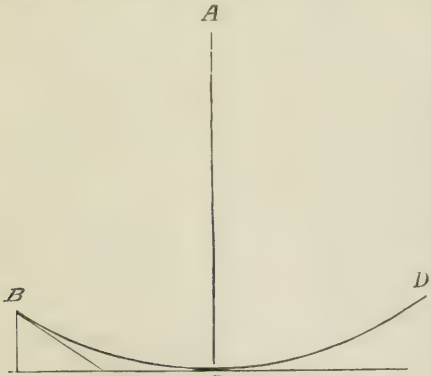

Fig. 7.

$$FC = a - \frac{a^3}{4r^2} + \frac{a^5}{16r^4} - \text{etc.},$$

where $\frac{a}{2} = EC$, or half the distance on the sphere, and $r$ is the radius $AC$ Sufficient accuracy is obtained by taking the first two terms only. $FB = \frac{a}{2r}\,FC$. The advantages of this projection are that there is no distortion along the central meridian or along a curve, which crosses this meridian at about 54° 44′ and gradually falls to 43° 46′ at the opposite meridian, and that the exaggeration of area is not great even in maps

embracing as large an area as the continent of Asia. FISCHER'S PERSPECTIVE PROJECTION, revived by Professor A. M. Nell and described by him in *Petermann's Mitteilungen*, Bd. 31 (1885), p. 295, also gives good results. Let *NS* be the axis of the sphere, *O* its centre, *OA* the equator and *B* the central point of the surface to be represented (Fig. 8). The plane on which the projection is made is the tangent plane at *B*, of which *BQ* is the trace on the plane of the paper. Then the centre of the projection, *C*, is found as follows. Let *P* be the limit of the map towards the north. On the tangent plane make *BQ* equal to the arc *BP*; join *QP* and produce it to meet *BO* produced in *C*. If $\beta$ and $\beta'$ be the latitudes of *B* and *P* respectively it may be shown that $CB = 2(\beta' - \beta)\frac{\sin^2\frac{1}{2}(\beta' - \beta)}{\beta' - \beta - \sin(\beta' - \beta)}$. In the article alluded to, Professor Nell shows how the latitudes and longitudes may be calculated, and the accompanying map of Asia gives ocular proof of the applicability of this projection to the representation of large portions of the earth's surface.

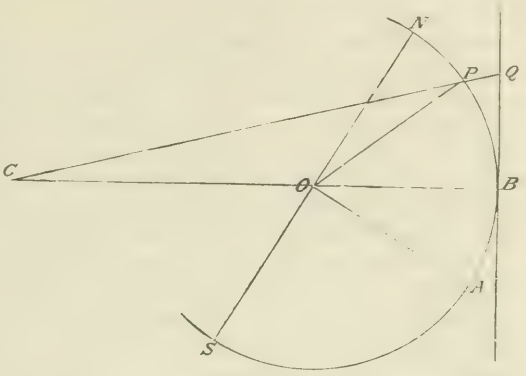

Fig. 8.

There remain to be discussed the projections called EQUIVALENT, which reproduce the surface of the earth without any exaggeration of areas, and are therefore employed in planimetric measurements. By integration, or by Newton's geometrical method, it may be proved that the area of any zone bounded by two parallels of latitude, is equal to a rectangle whose sides are the circumference of a great circle of the sphere and the depth of the zone measured perpendicularly to the equator. Accordingly, in the last century, Lambert produced an equivalent projection by extending the planes of the circles of latitude to meet the circumscribing cylinder. Of this, GALL'S ORTHOGRAPHIC PROJECTION is a modification, the cylinder used being the one cutting the sphere at the 45th parallels, whereby the distance between the meridians is diminished, and consequently the lands in high latitudes are less drawn out. Lambert also invented the ZENITHAL EQUIVALENT PROJECTION. It was this projection which was selected for

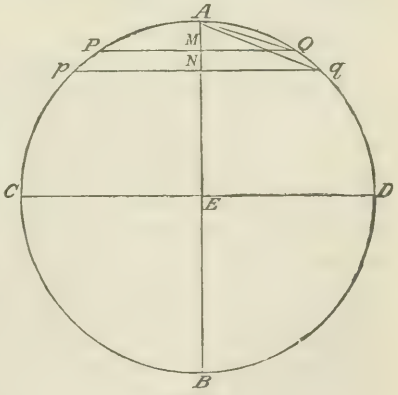

Fig. 9.

the maps drawn by Mr. J. G. Bartholomew for Dr. Murray's planimetric measurements. Specimens of these may be examined in the *Scottish Geographical Magazine*, vol. ii. p. 576, vol. iii. p. 76, and vol. iv. p. 64. Let the centre of projection (which may be any point whatever on the surface of the sphere) be denoted by $A$ (Fig. 9); let $AB$ be a diameter, $PQ$ and $pq$ planes perpendicular to $AB$. Now it has already been stated that the surface of any zone $Pp$ is equal to the area of a great circle multiplied by $MN$, the perpendicular distance between the bounding planes. So the spherical surface around $A$, cut off from the sphere by $PQ$, will equal $2\pi\ AE \times AM$, $AE$ being the radius. Now $2AE = AB$, and $AB \times AM = AQ^2$, whence $2\pi AE \times AM = \pi AQ^2$. Any spherical surface round $A$ is therefore equal to a circle, the radius of which is the chord drawn from $A$ to the circle which bounds it. To draw, then, a map of the hemisphere $CAD$, a circle must be drawn with radius equal to the chord $AD$, or $\sqrt{2} \times$ radius of sphere. Any other point $P$ will lie on a circle having the same centre and radius $AP$, and a zone $PQ\ qp$ will be represented by a circular zone, the breadth of which will be $Aq - AQ$. The distortion, though very marked at the circumference, increases slowly near the centre, and, therefore, is not conspicuous in maps of large continents. When the centre $A$ is a pole, the meridians are straight lines radiating from the centre of the projection, and the parallels of latitude concentric circles. In Mollweide's Equivalent Projection, called the HOMALOGRAPHIC, a circle is described of equal area to the hemisphere. As this area is $2\pi r^2$, where $r$ is the radius of the sphere, the radius of Mollweide's circle is $r\sqrt{2}$. The meridians intersect the equator at equal distances, and the positions of the parallels of latitude are calculated so that the area between them may be equal to that on the surface of the sphere. They are all straight lines, and the meridians are elliptic arcs. The whole surface of the sphere may be represented in one map forming an ellipse the major axis of which is double of the minor, while the circle before mentioned is the circle on the minor axis.

SANSON-FLAMSTEED'S PROJECTION is very commonly used, particularly for countries lying on or near the equator. The parallels of latitude are straight lines drawn at equal distances, and a straight line is drawn at right angles to them to represent the central meridian. From this meridian lengths are marked off on each parallel equal to a degree of longitude at the latitude of the parallel, and curves are drawn through these points to form the other meridians. Since, then, both meridians and parallels are at the true distance apart, the area contained within a pair of parallels and a pair of meridians is approximately equal to the area on the sphere. In high latitudes, the angles between the parallels and meridians become considerably diminished towards the edge of the map, whereby serious distortion is caused, and therefore this projection is more suitable for countries near the equator. Bonne's projection does not exhibit this error in so high a degree. It is a conical projection, but the longitude is marked off on every parallel instead of on the central parallel only, as in the ordinary conical projection. This error of distortion is, however, present, and to rectify it Professor Nell has, in *Petermann's Mitteilungen*,

Bd. 36, p. 93 (1890), proposed a new method. In Fig. 5, illustrating the conical projection, $Pq$, instead of being equal to $PQ$, is made of such a length that the zone on the cone is equal to the zone on the circle of which $PQ$ is the breadth. Let $PQSR$ (Fig. 10) be an area contained by two meridians and parallels of latitude drawn by this method, and let $LMSR$ be the corresponding area in Bonne's projection. Then Professor Nell draws the arc $TS$ between $MS$ and $QS$, and determines the position of the arc $VT$, so that the area $VTSR$ may be equal to either of the other areas, and therefore to the corresponding area on the sphere. The exigencies of the calculation will not allow the arc $TS$ to be precisely midway between $QS$ and $MS$; and, indeed, the whole theory is so intricate, that the method is not likely to come into general use. In the conical projection by which $PQSR$ is drawn, the meridians and parallels cut at right angles, but the meridional arcs are shortened as they recede from the central parallel, while the arcs of latitude are extended. Professor Nell's method, therefore, occupies a mean position between this and Bonne's.

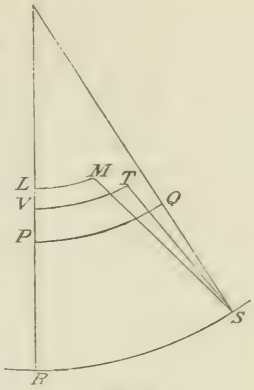

Fig. 10.

When maps of large size in several sheets are constructed, still greater accuracy may be obtained. A polyhedron may be described within the sphere, having very numerous small faces like the facets of a multiplying glass, their edges being in the same planes as meridians and parallels on the sphere, and each of these small faces may be taken as the plane of projection of the curved surface above them. A number of sheets is thus obtained, on which the country is so accurately represented that the errors are not greater than those which would arise in a perfectly accurate map from imperfect distension of the paper during the process of printing. These sheets cannot, of course, all be placed together so as to form a perfect whole, but the angles between adjoining sheets is so small that no apparent break of continuity is apparent when a few are placed together. This is known as the POLYHEDRAL PROJECTION.

Such are some of the most useful and generally used forms of projection. There are, however, a vast number of others by which cartographers have endeavoured to produce maps in which all errors should be as nearly as possible eliminated, or such as would be best adapted for some special purpose. A perfect map is, from the very nature of the case, impossible to construct, and it scarcely needs any argument to prove that, if a map be required representing areas exactly, or free from distortion, or showing any line on the sphere at its proper angle with the meridians, one at least of the other errors must be admitted. When planimetric measurements are to be made, or when angular accuracy is required for the purposes of navigation, the necessary conditions must be the first consideration, and no compromises can be admitted. For general purposes, on the other hand, those in which all the errors are present, but as far as possible reduced, are most suitable.

# GEOGRAPHICAL NOTES.

## EUROPE.

**The Draining of the Zuider Zee.**—It is well known that the site of the Zuider Zee was at one time inhabited country. South of a line drawn from Enkhuizen to Stavoren moorland extended from Friesland to join the moors of Holland and Utrecht. To the north lay "Friesland over de zee," of which Texel, Vlieland, and the other islands formed a part, while a great portion, whereon stood the villages of Grind, Grebbe, Gonfeind, etc., is now submerged. Between this land and the moor above mentioned lay Lake Flevo—according to Tacitus and other ancient writers, about as extensive as the Lake of Constance—which was drained principally by the Vlie, a broad stream entering the sea where the Vlie channel, between Vlieland and Terschelling, now lies. It was along this stream that the disturbances first began. In 1170 a large part of the west and north-west coasts was swept away, after which the waves advanced rapidly until they were stopped by the firmer and higher ground of Utrecht and Veluwe, on the south, and by dykes erected on the coasts of Holland and Friesland. Since 1848 no fewer than twenty schemes for reclaiming this land have been proposed, the most important of which have lately been discussed in the *Deutsche Rundschau*, xii. Jahr. 5 Heft, and, more fully, in the *Tijdschrift van het Kon. Nederlandsch Aardrijkskundig Genootschap*, Deel vi. No. 1. Among the advantages to be derived from this undertaking, besides the obvious gain of an area of cultivable land large enough to form a new province, are a large decrease in the length of dykes to be maintained, almost the whole shore of the Zuider Zee being now protected by them; diminished risk of inundation; an abundant supply of water for the irrigation of polders, which, though the supply of water is usually in excess, sometimes suffer from drought in dry summers; the preservation of the islands, which are now threatened with extinction; and the fertilisation of the land by a large quantity of river mud, which is now deposited on the bottom of the sea. From borings carried out by the engineer Stieltje and Lieut.-Colonel Beyerinck, during the years 1868-70, and by the Government in 1873, it appears that south of the line from Enkhuizen to Kampen the bottom of the sea is covered by a layer of clay, in some places over six feet deep, while to the north of this line sand predominates, especially to the north-west of Friesland, where it is found free from any admixture. Professor van Bemmelen, who tested the samples of earth supplied to him by Stieltje and Beyerinck, expressed his opinion that 75 per cent. of the land south of the line Enkhuizen-Kampen would be suitable for cultivation. Turning now to the action of the waves on the coasts of the Zuider Zee, it will be easily understood that vast quantities of water are driven at every tide through the channels between the islands against the coast of Friesland. It has, therefore, been several times proposed to close the Eierlandsche Gat, the shallowest of these channels. Again, the tide takes six hours to reach the southern end of the sea, so that high tide at Schellingwoude and low tide at the Helder occur at about the same moment. Hence, the inflowing water from the north and the ebb water from the south meet half way, and keep the water constantly at a high level along the shore of Friesland between Lemmer and Blokzijl. Storms, which usually commence in the south-west and veer round to the north-west, considerably increase this effect, sweeping the water away from the east and piling it up on the west of the sea. During the noted storm of Whitsuntide 1860, the water was 16 feet higher at Vollenhoven than at Durgerdam, 50 miles distant. Should, then, a plan be adopted for enclosing the southern part of the Zuider Zee, it will be necessary to consider how the tides will

be affected by confining the sea-water within narrower limits, and whether the discharge of the rivers will be more impeded than at present by a small difference between high and low water. Indeed, the providing of outlets for the water of the rivers and the prevention of silting up, is a most important, if not the most important, problem connected with the undertaking. How large the quantity of water to be discharged into the sea may be, it is not possible to ascertain exactly, but Heer P. A. van Buuren estimates the maximum quantity poured into the sea by the IJssel and other large estuaries at about 123,000 cubic feet per second. To this must be added the drainage of North Holland, part of Friesland and other districts, besides the drainage of the reclaimed land. Since the water near Vlieland does not stand lower than three feet below the Amsterdam water-mark (the mean height of the water on the Dutch coasts) for much more than three hours in the day, nearly all this water must be pumped into the North Sea by steam power, if the whole of the Zuider Zee be enclosed. Furthermore, the channels must be large enough to contain the ice brought down in winter and the larger amount of mud discharged during floods.

An engineer has therefore great difficulties to encounter in enclosing the whole of the Zuider Zee up to the islands. The latest scheme of this kind was proposed in 1882, by Heer A. Buma. He would build a dyke from the Helder to the east coast of Texel, leaving a deep and roomy basin for shipping, and another from Nieuwe Diep, behind the former and the islands Vlieland and Terschelling, to Ameland. He would also connect the islands by dams, whereby they would be preserved from destruction, and the inner dyke be sheltered from the waves of the open sea. The waters of the IJssel and other rivers would be conducted between dykes to a reservoir lying behind the ship harbour before mentioned, where, in times of flood, the excess of water might be stored until it could be pumped out to sea. Heer Buma's dykes would have to be built on insecure ground across channels 65 to 130 feet deep, through which flow large and rapid currents. The engineer, Heer Welcker, estimates the quantity of water to be discharged at 8,830,000 cubic feet per second, the total width of sluices required at 1640 yards, and the engines at 15,000 horse-power. Such an undertaking, if it be practicable, would certainly not be a financial success. Those schemes which aim at reclaiming the clay-land only, at the southern end of the sea, promise better results. Such is the one propounded by Heer Beijerinck in 1865, amended by Heer Stieltje, and further modified by a Government commission in 1873. The sea in this part is very shallow, particularly along the coasts of Utrecht and Gelderland, being nowhere deeper than 16 feet below the Amsterdam water-mark. According to the perfected scheme, an enclosing dyke, raised to a height of 16 feet above the Amsterdam water-mark, was to be carried from Enkhuizen past Urk to Kampen. Behind this was to run a canal opening into two reservoirs, one at Urk and the other near Enkhuizen. The water in this canal was to stand at 13 feet below the Amsterdam mark, and the North Sea canal to be raised to the same level, so as to co-operate with it. 883 million cubic feet of water would be poured on to the reclaimed land in the twenty-four hours, half of which would flow off of itself, while the remainder would be pumped out by engines of 800 horse-power at Enkhuizen, and 350 horse-power at Urk, sluices having a total width of 460 feet affording it means of escape. By these works nearly 500,000 acres of land would be shut off from the sea, one-thirtieth of which would be appropriated by the drainage canals and reservoirs. The length of the dyke would be about 25 miles, so that each acre of land would be burdened with the cost of only about $3\frac{1}{4}$ *in.* of dyke. The cost of the undertaking was estimated at $10\frac{1}{2}$ millions sterling, and, including loss of interest during the construction of the works, it would probably amount to more than 13 millions. In 1886, the Zuiderzee Vereeni-

gung was formed to make inquiries into the most advantageous and practicable ways of carrying out the reclamation. Heer C. Lely of the *Waterstaat* is the technical adviser of the society. It has not yet definitely decided on a scheme, but the following measures appear, from the information collected, to be advisable. A barrier dyke might be constructed on the hard sand between Wieringen and Piaam, within which four polders might be formed, namely—(1) Along the coasts of Gelderland and Utrecht between Kampen and Muiden ; (2) in the triangle Lemmer-Urk-Zwartsluis ; (3) between Wieringen, Medemblik, and the east coast of North Holland. The remainder of the enclosed space would be occupied by a lake covering nearly 200,000 acres. Sluices of 1000 feet in width would suffice to carry off the water. The level is expected never to exceed 5 feet above the Amsterdam water-mark within the dyke, and 9½ feet outside. If such a plan were carried out, only the valuable land would be reclaimed, and the coast of Friesland would receive the protection which Stieltje's system fails to supply. The alluvium of the IJssel, estimated at some 700,000 cubic feet annually, would raise the bottom of the enclosed lake less than one-hundredth of an inch yearly, so that no danger would arise from that source.

**The Delta of the Neva.**—M. Venukoff has sent a note on the growth of this delta to the Paris Geographical Society (*Compte Rendu*, No. 4, 1890). The most ancient Russian annals make no mention of the Neva, but state that Lake Ladoga was in direct communication with the sea. It is, at any rate, certain that the whole country between the lake and the Gulf of Finland was formerly much lower and more marshy than at present ; so that, when St. Petersburg was founded, in 1703, the ground had to be raised by wood and stones. Since then the ground has been further raised above the water by artificial means, at a rate estimated by Celsius, in 1743, at 4½ feet in a century. A more reliable calculation, based on a comparison of maps drawn in 1743 and 1889, shows that the surface of the delta has increased during the interval by more than 1000 acres. This is also a criterion of the natural increase of the delta, for the efforts of the Russians have aimed solely at raising the level. The increase mentioned is very small when compared with that of the deltas of the Rhone, Danube, etc., for the water of the Neva is very pure, having deposited its alluvium in Lake Ladoga, only 40 miles from the sea. It has been greatest in the northern islands of the delta : the island of Zadimirowski, which has now an area of 27 acres, did not exist at all in the reign of Catherine II., barely eighty-five years ago. The area covered by water not more than 3 feet deep is about 2800 acres, and the lagoon, which lies between St. Petersburg and Kronstadt and is 15½ miles long by 6 to 9 broad, is being gradually silted up with mud and sand, so that at no very distant date the mouth of the Neva will probably lie at the western extremity of the island of Kotlinoï, on which Kronstadt is built.

**Russian Surveys.**—M. Venukoff, our Hon. Corresponding Member, sends us the following note :—At the beginning of the month of April the annual exhibition of the results of the geodetic and topographical work, accomplished by the general staff of the Russian army during 1889, was held in St. Petersburg. The following are the most important works exhibited :—

(1.) Map of the 52d parallel in Western Europe and in Russia : it is intended to accompany the report of General Stebnitsky on the measurement of this parallel, which is now in the press. The work on hand at the present time is the measurement of the 47th parallel from Kishinev to Astrakhan.

(2.) A topographical survey of the Central Caucasus between Mounts Elbruz and Adaï-khokh, which gives for the first time exact details of the configuration of this mountainous district. Here are a few of the figures it contains :—

(*a*) Heights of mountains—

| | |
|---|---|
| Western summit of Elbruz, | 18,470 feet. |
| Dykh-tau, | 17,054 " |
| Shkhara, | 17,041 " |
| Kashtan-tau, | 16,881 " |
| Janghi-tau, | 16,657 " |
| Western summit of Umba, | 15,603 " |
| Adaï-khokh, | 15,240 " |

(*b*) Lengths of certain glaciers—

| | |
|---|---|
| Ullu-chiran, | 11½ miles. |
| Dykh-su, | 10 " |
| Kara-gom, | 8 " |

(3.) A map of the Khanate of Khiva, drawn from the surveys of 1888-89: it contains many new details, and shows how the configuration of the land in the Delta of the Oxus has in the course of time been altered by the annual inundations.

(4.) A map of the Lower Ili between the Fort Iliysky and Lake Balkash, on which the new Russian colonies on the bank of the river are marked.

(5.) Map of the province of Irkutsk on the scale of 1 : 1,680,000.

Captain Grombtchevsky, having explored the country watered by the tributaries of the Upper Yarkand Daria, has proceeded to Nia to discuss with Colonel Pevtzov their future plans for the exploration of Upper Asia.

## ASIA.

**The Russian Territory on the Afghan Frontier.**—A description of this part of the Asiatic possessions of Russia from information supplied by General Kulberg, a member of the Afghanistan Frontier Delimitation Commission, has appeared in *Deutsche Rundschau*, xii. Jahr. 7 Heft. The northern slopes of the Parapamisus, lying to the east of the Tejend River—namely, the Barkhut and Chingurek hills, the Bend-i-Gandas and the Tirband-i-Turkestan—form an extensive plateau, about 100 miles in length from north to south and gradually sloping down to a sandy plain which stretches up to the Amu Daria. The southern limit of this plain runs from Sarakhs on the Tejend through Sari Yazi on the Murghab to Jelayur on the Andkui River. The surface of the plateau is very undulating and covered with mounds of sand and loam: between the Tejend and Kushk the vegetation is extremely scanty and monotonous. Among the most elevated points are the plateau of Karabil (4000 feet), the source of the river Kaisar near Sofi (3900 feet), and the heights near Kara Tepe on the left bank of the river Kushk (3200 feet). There are rich pasture-lands over all the plateau, but as the surface sinks the vegetation becomes poorer, until at last nothing is seen but sandy wastes. The Murghab alone contains running water all through the year; the other rivers only in spring—that is, however, the time when the fields require irrigation. Along the Middle Tejend agriculture is possible on the Russian side near Sarakhs only, but more favourable conditions exist in other valleys: the town of Andkui is surrounded for a distance of more than 5 miles by gardens and fields. Immediately on the banks of the Amu Daria another strip of cultivation, 2 to 5 miles broad, encroaches on the desert. The climate is marked by sudden changes of temperature. In winter, warm days are succeeded by snowstorms and frost. The snow often lies on the ground for a whole month, and the thermometer falls 36° to 45° Fahr. During the dry summer of four months the temperature remains constant at about 104° Fahr. in the shade, and in the evening a warm north-east wind (about 90° Fahr.) blows along the Amu Daria. In the oasis of Panjdeh there are 75,000 Turkmans;

Andkhui contains some 15,000, and the town of Meimene 12,500 in summer, and double that number in winter, when the nomadic population flocks in. The province of the same name is very fruitful, and exports large quantities of corn to the Amu Daria, Bokhara, and Turkestan. On the southern bank of the Amu Daria, from Charjui to the frontier at Chushka Khusar, dwell Turkmans of the Erzari tribe, who also constitute the larger part of the population on Afghan soil as far as Bossag. On the Bokharian territory live Erzari and Kara Turkmans with a few Usbeg immigrants. The total population on Afghan soil is 30,000, and on Bokharian, 110,000.

**Formosa** has made great progress under the present governor, Liu-ming-juan. As soon as he came into office, a railway from Tamsui to the coal mines of Kelung was commenced, and, at the end of 1888, 37 miles were opened for passenger traffic, postage-stamps being used for tickets. The governor intends to carry a railway all round the island, to facilitate defence against enemies from without and the subjugation of the independent natives. In 1888, the value of the imports at the port of Tamsui was £1,499,048, and of the exports £809,345. Of the latter sum by far the larger part represents black tea ; coal, the exportation of which had doubled itself since 1887, and camphor were the other important exports. From Takau, at the southern end of the island, brown sugar and a small quantity of camphor were exported, the value being £314,074. In both ports European woven materials are being driven out by the products of Chinese looms.—*Globus*, Bd. lvii., No. 13.

## AMERICA.

**Ice in Bering Sea and the Arctic Basin.**—A report on the condition and movements of the ice in these waters, drawn up by Ensign Simpson of the U.S.S. *Thetis*, has been issued in pamphlet form from the Hydrographic Office in Washington. The Arctic pack, consisting of hard blue ice in comparatively level fields interspersed with hummocks, breaks away from the shore ice in the spring and moves northward. "Leads" of open water run into it for short distances, continually changing their position with the wind. Later in the season the shore ice breaks up into icebergs and follows the pack northwards. The ice in Bering Sea is exclusively "young ice,"—that is, it is formed new every season. Its southern limit extends from Bristol Bay to about 35 miles south of Pribylov Island (about 56° N. lat.), and then northwards towards Cape Omchinsky (?). In exceptionally severe winters the ice has been found as far south as Unimak Pass. In the spring the pack remains in the middle of the sea for some time after it has left the shores. Which coast is clear first depends to a great extent on the prevailing winds, but as a rule the west coast has the advantage over the east, the strong current on that side invariably clearing the ice north of St. Lawrence Island up to the Diomede Islands before a passage is opened along the east coast. The ice leaves Pribylov Island about May 1st, and vessels following in its wake reach Cape Navarin about May 10th, and St. Lawrence Bay about June 10th to the 25th. The current through Bering Straits runs northwards at about two knots an hour, and strong southerly winds increase its velocity to three knots. In the spring it is more rapid on the eastern side, but the western shore is clear earlier, owing to the north-easterly current having swept up the ice sooner from the south. June 15th to the 25th is the time when the Straits become navigable. In the Arctic Ocean the pack breaks off at an offing of 2 to 10 miles, and is swept northwards by the currents which flow, on the west past Cape Serdze and Koliutchin Island, and on the east past Kotzebue Sound, Hope Point, and Cape Lisburne.

Vessels reach Hope Point about July 4th, Cape Serdze about a week earlier. The time of departure of the shore ice varies greatly : in 1886 it moved off on July 13th, while in 1889 it left on June 14th. The pack reaches its northern limit in the latter end of August or the beginning of September. The general line of its edge lies between Point Barrow and North Cape. It is very irregular and varies considerably in different seasons. The current, which follows the Siberian shore from Bering Straits, turns northwards to Herald Island, and by the end of autumn has formed a gap in the pack known as "The Hole," extending about 30 miles to the north of the island. The centre of the pack, being less exposed to the action of currents and being increased by drifting floes, forms a point called "Post Office Point," the position of which varies from 160° to 170° W. long., and in very open seasons is found as far east as 157° W.

In the neighbourhood of Point Barrow young ice begins to form round heavy ice about September 15, and by September 22 in open water ; at the end of the month it connects the shore with the pack, which has again moved southwards. On November 1st Icy Cape is beset by the pack ; Kotzebue Sound is frozen over by October 10th to 15th. All vessels should be out of the Arctic Sea by October 10th. About the beginning of November the northern part of Bering Sea is closed to navigation, and the pack gradually expands until it has advanced a little further south than St. Matthew Island. The ice found still further south consists of detached floes driven off from the mouths of the rivers of Alaska. A map accompanying Ensign Simpson's report shows the limit to which the Arctic pack retired in several different summers.

**Observations on Pike's Peak.**—The observations recorded at this, the highest meteorological station in the world, have been published in the *Annals of Harvard College Observatory*. Pike's Peak is situated in Colorado, in lat. 38° 50′ N. and long. 105° 2′ W., and it rises to a height of 14,134 feet. The observations published are those for the last six years, from Jan. 1st, 1874, when the station was first in full working order. The curves of temperature and atmospheric pressure show a remarkable similarity ; not only has each a single maximum in July and minimum in January, but they rise and fall at the same rate, a difference of ·016 *in.* in the mean monthly pressure corresponding to one degree Fahrenheit in the mean temperature. On Mount Washington, New Hampshire (6,279 feet above the sea-level), a similar relation between temperature and pressure is noticeable, but it is not so regular, the maximum pressure tending to prolong itself into August, and the minimum over the months of February and March. The mean temperature of Pike's Peak is 19°·3, with a range of 4° in the annual mean. The highest temperature observed was 64°, on July 19, 1879, and the lowest 39°, on December 31, 1887. The maximum daily ranges occur in July and September (14°·3 and 14°·2 respectively), and the minimum in December (11°·6). The daily range at Mount Washington varies in a totally different manner, for it attains its maximum (18°) in January, decreases regularly to its minimum (10°·6) in July, and again rises to its winter maximum. The amount of precipitation on Pike's Peak sinks to a minimum in February, attains a secondary maximum in April, and reaches a secondary minimum in June, followed by the primary maximum in July. Thirty-five per cent. of the total precipitation has been recorded in summer, 33 per cent. in spring, and the remainder was very equally distributed over the other months. The June minimum is remarkable, but is confirmed by observations of a similar phenomenon in the surrounding country. The curve of mean wind velocity assumes, in general, opposite phases to that of the mean temperature, and this rule applies even to the mean hourly temperature and wind velocity. In July the

maximum hourly velocity is 155 miles per hour and the minimum 9 miles, but in January the range is greatly reduced, the maximum being 28 miles and the minimum 25·4. The most prevalent wind is the south-west, 31 per cent. of the wind coming from that quarter, while 21 per cent. blows from the north-west and 20 from the west. The observations made at Colorado Springs, at the base of the mountain, show very different wind conditions. There the north wind prevails and is 27 per cent. of the whole, the south-east appearing next in order (22 per cent.). Severe storms are unusual on Pike's Peak, and the days are comparatively few when the mean hourly velocity equals, or exceeds, 50 miles per hour. The mean annual cloudiness is 40 per cent., ranging from 33 per cent. in November to 74 per cent. in July.—*Science*, Feb. 21, 1890.

**Venezuela.**—The *Bollettino della Soc. Geog. Italiana*, vol. iii., fasc. ii., reproduces a few statistics relating to these States from the *Annuario Statistico*, published in Caracas in July 1889. The total population on January 1st 1888 was 2,238,922, and the increase during the preceding year 26,418. The native inhabitants numbered 326,000, of whom 66,000 were independent. The area of the republic is 599,498 square miles, of which the basin of the Orinoco occupies 366,565, and the drainage area of Lake Maracaybo 68,486. There are 134,934 square miles of cultivated or cultivable land, 156,487 of pasture grounds, and 308,077 of irreclaimable land. The climate is good, on the whole. The temperature rarely rises above 92° F., and, in inhabited places, does not fall below 44° : the average mean for the whole of Venezuela is 71°·15. Pastoral industry has developed so greatly that, in 1888, there were 17,680,665 grazing animals in the country, of which 8,476,291 were cattle. There are numerous mines of gold, copper, and coal, and a great variety of ornamental woods, dye-woods, textile and medicinal plants. The foreign trade of the country has doubled in value during the last twenty years, and still continues to advance. The value of the imports in the financial year 1887-88 was £3,158,530, and of the exports £3,608,405.

**The Province of São Paulo, Brazil.**—The following account of this province is extracted from an article by M. Hubert van de Putte, inserted in the *Bull. de la Soc. Roy. Belge de Géographie*, No. 5, 1889 and No. 1, 1890. Though it lies partly within the tropics, its central and most important part enjoys a temperate and healthy climate owing to its elevation, and its natural advantages—the fertility of its soil, the numerous rivers which pass through it and may be utilised either as waterways or as a source of motive power, and its immense virgin forests—place São Paulo at the head of the States of the Republic and promise it a most prosperous future. On the north it is separated by the Rio Grande from the province of Minas Geraes ; on the south the river Parapanema forms the boundary towards the province of Parana ; and on the west São Paulo extends to the river Parana, beyond which lies Matto Grosso. The country falls into two natural divisions ; a strip of low land, 8 to 80 miles broad, extending along the Atlantic, and an elevated region, occupying all the interior of the province and having a minimum height of about 1600 feet. There are two principal mountain ranges ; the Serra da Mantiqueira, which at the north-eastern extremity of the province runs parallel to the coast, and then, suddenly bending north-westwards towards the Rio Grande, forms the boundary between São Paulo and Minas Geraes ; and the Serra do Mar, which traverses the whole province at a short distance from the coast. Besides these, there are numerous mountains of less importance, either isolated, or connected with one of these main ranges. The littoral is drained by the Ribeira and a few insignificant streams. The Ribeira rises among the southern ramifications of the Serra do Mar, and runs eastwards until it meets the Rio Juquia, after which it

turns towards the south-east and enters the sea at Iguape, after a course of about 300 miles. It is navigable for some distance. The north-eastern part of the interior is drained by the Parahyba, which rises in a crest of the Serra do Mar, and, after a course of about 370 miles, enters the province of Rio de Janeiro. The rest of the elevated country is intersected by rivers flowing into the Parana, of which the principal are—the Rio Grande, already mentioned, which skirts the province from east to west for a distance of 400 miles and receives on its left bank the Mogy Guassu; the Tieté, which divides the province into two nearly equal parts and, between its source in the Serra do Mar and the Parana, has a length of some 800 miles; and the Parapanema, which rises in the Serra Paranapicaba, a prolongation of the Serra do Mar, and has a course of about 500 miles. The Mogy Guassu has a mean breadth of ninety yards, and contains clear water abounding in fish; steamers ply along the greater part of its course. The Tieté also is navigable below the mouth of its tributary, the Piracicaba, and the latter from the town of the same name to its mouth. Certain sections of the Parapanema and its tributaries, the Itapetinga and the Apiahy, are navigable, but falls interrupt communication on this as on all the other rivers, including the main stream, the Parana, so that it will be impossible to carry goods by water direct to the ocean, unless engineering skill shall be able to remove these obstacles. Regular steamboat service is maintained over an aggregate distance of 394 miles.

From a geological point of view the province of São Paulo may be divided into three districts. The first of these is the mountainous region along the coast, where the crests are formed principally of gneiss mixed with granite and syenite, and on the slopes are found also strata of schists, sand- and lime-stone. Here lie the mineral riches of the country—magnetic iron, gold, and marble. The second region, having a mean elevation of nearly 2000 feet and valleys sinking 300 to 600 feet below this level, is composed of sandstones and schists dating from the coal period, in which a few deposits of coal have been discovered. The *terra roxa* of this region, formed by the decomposition of diabase, which occurs here in numerous dykes, is much esteemed for the cultivation of coffee. The third region is a still more elevated plateau with deep valleys and precipitous river-banks; its geological structure differs but little from that just described. It has been little exploited, and nothing is known of its mineral wealth except that agates are found there in abundance. Virgin forests cover a large part of the province. The climate of the interior is healthy and temperate, the thermometer seldom falling below freezing-point, and never rising above 95° Fahr.; the mean on the elevated lands is about 66°, and near the coast 73° Fahr. Observations, made at the observatory of the town of São Paulo during the year 1887, give the mean height of the barometer as 27·5 in.; the rainfall 58·66 in.; rainy days 188, cloudy days 40, and clear days 137.

The area of the province is about 115,000 sq. miles; its population, in 1886, was 1221,394, or 10¼ to a sq. mile, and since then immigration has increased enormously. The most important occupation and the principal source of wealth in the province is agriculture. Among the crops may be mentioned coffee, sugar-cane, cotton, tobacco, manioc, vines, and cereals. Of these coffee is the most profitable. On seven acres of ground a man can plant and tend 2000 bushes, which will yield annually on an average 46 cwt. of coffee, worth £66 or £67, half of which represents the remuneration of the labourer. Neither manure nor digging is required; the ground has only to be kept clean with the hoe. Next in order comes sugar-cane, yielding a return of about £4 an acre. The production of sugar might be largely extended and be rendered more profitable by the introduction of better machinery and by a more judicious selection of plants. Viticulture also has a brilliant future before it. Experiments have been made with Chinese grass, vanilla, coco,

and with some of the cultivated plants of Northern Europe, such as wheat and flax, but no decided opinion can be expressed concerning the probability of their thriving. Cattle-rearing is carried on on a large scale ; sheep are very rarely kept, and dairies are not numerous. The manufacture of sugar is conducted in too elaborate a manner ; a less refined article would pay much better. Good spirits are distilled, equal to the best European gins. The exports of the province find an exit at the ports of Santos and Rio Janeiro, and in 1886-87 were of the value of £8,632,000, or 40 per cent. of the total for Brazil. The principal articles are coffee, hides, and precious stones. In the same year the value of the imports was only about £2,610,700, representing chiefly cotton, wool, and linen goods, hardware and machinery, grain, flour, and alcoholic liquors. Manufacturing industries had hardly any existence twenty years ago. There are now a few cotton mills, several gasworks, an unprofitable foundry, etc. Besides the waterways already mentioned, São Paulo possesses 1133 miles of railway, connecting the capital with Santos and with Rio Janeiro, and radiating into the interior.

In 1888, when slavery was abolished in Brazil, the province of São Paulo contained about 60,000 slaves. Of course, as in other provinces, the Negroes immediately struck work, and a large part of the harvest was lost in consequence. But the substitution of white labourers for black will be greatly to the advantage of the country, the work of the former being far superior both in quantity and quality. The number of immigrants, which in 1887 was 33,310, continues to increase. The greater part go to work at the coffee plantations. On these the colonist finds a cottage ready for occupation, and receives from the proprietor all that is necessary for himself and his family until the crops are sold. The colonists share with the proprietor the profits arising from the coffee, but the crops of maize, beans, etc. are entirely their own.

**Peru.**—In 1888, a letter from Dr. A. Hettner was published in the *Verhandlungen der Gesell. für Erdkunde zu Berlin*, containing a general sketch of the region between the plain of Arequipa and the Pacific (*vid. Magazine*, vol. v., p. 502). Since then several letters have appeared (*Verhandlungen*, Bd. xvi., Nos. 3, 6, 8 ; and Bd. xvii., No. 2), in which Dr. Hettner communicates the results of his wanderings in the Titicaca basin and the country between that lake and the river Urubamba. Setting out from Arequipa and passing by the Pichu-Pichu mountain and the volcano of Ubinas, he reached, at the Alto de Toledo, the highway to Puno, little frequented since the opening of the railway. A few hours' journey further the volcanic rocks and tuffs give place to sedimentary deposits, which extend to the shores of Lake Titicaca. They consist principally of conglomerates, red sandstones and clay, and hard blue limestone, and have been referred by Forbes to the Permian system, but Dr. Hettner believes them to be of later origin and, probably, to date from the chalk period. The watershed between Lake Titicaca and the Pacific lies in this region, shortly before the traveller reaches Las Lagunillas, two lakes surrounded by picturesque mountains. Puno, a town of about 5000 inhabitants, situated on a land-locked bay of Lake Titicaca, is an important commercial centre, being the terminus of the railway from Arequipa and Mollendo and the starting-point for the steamers which ply along the lake. Through it also runs the boundary between two Indian tribes : the Quichuas, who inhabit the country to the north of the town, and the Aymaras, who extend southwards to La Paz, where they again give place to the Quichuas. The lake has an area equal to that of the kingdom of Saxony, and lies at an elevation of nearly 13,000 feet. It is bounded on the north-east by the outliers of the eastern cordillera, and on the south-west by a chain, which is prolonged over the plateau of

Bolivia, and consists chiefly of the conglomerate and red sandstone already mentioned. Between Pomata and Zepita, however, two masses of trachyte form the peninsula of Yunguyo and the south-western part of the peninsula of Copacabana, and beyond the southern extremity of the lake lofty summits of diorite and other crystalline rocks occur. The waters of the lake are said to have receded within the memory of man: it is, at any rate, certain that its surface stood at one time at a much higher level, for small plains fill up the intervals between the mountain spurs, and in some places skirt the shore, while unmistakable terraces are observed at a height of 70 to 100 feet about the lake, and recent sedimentary deposits are found in certain places as high as 650 feet. Between the periods when the waters of the lake stood at these two different levels they must have sunk lower than the present surface. Dr. Hettner believes it to have been during the glacial period that the terrace at 70 feet was formed. The river Desaguadero flows out of the lake at its southern end, and, passing through the mountains which skirt its south-western shore, along a valley about 3 miles long by $1\frac{1}{4}$ broad, enters a wide plain which extends to the lake of Poopo or Aullagas. It seems probable that formerly the two lakes formed one, having a strait between the mountains similar to the narrow strait of Tiquina which now connects the two parts of Lake Titicaca. The river flows in a meandering bed, divided into several channels, and loses so much water by evaporation that navigation becomes more difficult as the stream descends. Steamers now descend with difficulty to Nasacara to carry away copper ore from the mines of Corocoro. The north-eastern part of the peninsula of Capacabana is composed of carboniferous rocks, and the low hills lying between Tiahuanaco and La Paz were formed in that period and the Devonian. The Bolivian plateau rises considerably towards the north-east, that is, in the direction of the main range of the Andes, and in the valley of La Paz, 1000 feet deep, its composition may be clearly seen—soft clays and gravels from the top to the bottom, with a layer of trachyte tuff, thirty feet thick, between the gravel and clay. Various considerations induced Dr. Hettner to refer this formation to the Tertiary period, though he obtained no palæontological proofs. At Chuquiaguillo, a league from La Paz, are the gold mines to which the town owes its foundation. Passing close by Illimani, the second highest peak of the Bolivian Andes, Dr. Hettner made an excursion to the Yungas, as the western slopes of the Andes are called. Owing to the swollen state of the river La Paz, he was not able to follow it through the Angosturas, the deep and narrow valley by which it finds its way through the main chain, but he is convinced that the river has not availed itself of a fissure already made, nor, being older than the mountain range, excavated its bed deeper and deeper as the upheaval progressed, but that it met with less resistance on the steeper, and more rainy, eastern side of the Andes than on the other. There also are traces of extensive glaciation, which may be looked for in vain on the west cordillera. Though Dr. Hettner saw only Silurian rocks *in situ*, he concludes from the presence of numerous granite and porphyry boulders, especially in the streams descending from Illimani, that these rocks play a more important part than has been supposed in the construction of these mountains.

After returning to La Paz Dr. Hettner proceeded northwards past Yani, where gold is found in veins of quartz intersecting the Silurian slates, to Tacacoma, near which place the river Sorata forces its way through the main chain. This river, however, has not formed such a striking gorge as the Angosturas, for the mountains sink rapidly down from Illampu, and are split up by longitudinal valleys. The town of Sorata is exceedingly pretty, and enjoys a pleasant, though rather moist, climate. It is a centre for the trade in Peruvian bark, and in the neighbourhood is grown a large part of the wheat and maize consumed in the highlands. Near

Apolobamba Dr. Hettner again crossed the ridge of the cordillera, and found the snow-line on the eastern side about 650 feet lower than on the western. Silurian stratified rocks only were to be seen, and granite seemed to be really absent here. At the head of the lake lie several well-watered plains, divided from one another by ranges of mountains, of which the most important terminates in the peninsula of Capachica.

After a rest of several days in Puno, Dr. Hettner followed the western cordillera to Lampa, passing the silver mines of Chupica and Chocchoni, which are singular in that at the former the ore lies in red conglomerate, probably of the Cretaceous period, while at the latter it is extracted from trachyte and andesite. Further north the river Macusani breaks through the main chain of the eastern cordillera—another proof that this range is not the watershed of the country. There are, indeed, three ranges on the northern side of the Titicaca table-land which rise into the region of eternal snow; one, extending past the town of Macusani on its northern side, rises to its highest point in the summit of Allin Ccapac, and is a continuation of the Coololo cordillera, which runs parallel to the lake of Titicaca; another, somewhat more to the south and with lower peaks, constitutes the watershed between the elevated region and the streams of the eastern slope; a third runs close by Santa Rosa, and is named by Dr. Hettner the Vilcanota range, after the river of that name. While the two former are composed of Silurian rocks intersected by dykes of granite, the last belongs to the porphyry formation. A little beyond Santa Rosa the watershed called La Raya is crossed, and the traveller enters the Peruvian sierras, where warm valleys produce a more luxuriant vegetation. The most notable feature in the orography of the neighbourhood of Cuzco is the sudden contraction of the ranges of the Andes, caused, not by their convergence, but by the disappearance of the cordilleras extending northwards from the highland of Titicaca, a new chain appearing in their place. Of the three cordilleras lately mentioned, the most easterly suddenly ceases just beyond the valley of Marcapata, the next is continued somewhat further in the cordillera of Chimboya, and then, sinking to an average height of 11,500 feet, is gradually lost in primeval and unexplored forest. The Vilcanota cordillera diminishes in height immediately to the north of the watershed, and spreads out into a broad zone of jagged mountains. A remarkable feature is a short range, running out south-westwards from the Chimboya cordillera at right angles and gradually rising till it culminates in Auzangate, the highest peak in the whole country. Within this range, the Chimboya, and the Vilcanota, is enclosed a high, gently undulating plateau. From near the town of Calca a succession of snowy summits runs on the northern side of the Vilcanota range, which might be named after its highest peak, Panticalla. Below Ollantaytambo it crosses the Vilcanota River, and in the peak Sarcantay attains almost as great a height as Auzangate. The north-eastern slope of the Chimboya cordillera exhibits the characteristics of the whole of the eastern slope of the Andes, just as they are seen in the Yungas of La Paz. It is a region of transverse valleys drained by the Madre de Dios and the Purus. To the south-west of the Chimboya, on the contrary, longitudinal valleys are the rule, some of them enclosed by cross ranges. The latter have a much clearer atmosphere than the open valleys, while those of the eastern slope are the dampest and most cloudy of all. Dr. Hettner says little about the western cordillera, which he crossed between the Apurimac and the coast: he describes it as a dreary monotonous highland, composed of tuffs and other volcanic rocks.

## GENERAL.

**Waves: their relation to the Velocity of the Wind.**—Professor C. Börgen has published in the *Annalen der Hydrographie*, Heft 1, 1890, an equation for determining the height and length of waves, when the velocity of the wind and the length of time it has been blowing are given. Since waves rise gradually under the action of wind, and tend to a certain height depending on the velocity of the wind, which they do not surpass, however long the wind may remain in the same quarter, the hyperbolic form naturally suggests itself. Professor Börgen gives the following forms—

$$h = \frac{h_m}{1 + \frac{a}{t}} \qquad \lambda = \frac{\lambda_m}{1 + \frac{\beta}{t}}$$

which represents rectangular hyperbolas, if $h$, $\frac{1}{t}$ and $\lambda$, $\frac{1}{t}$ be taken as the respective co-ordinates. $h_m$ and $\lambda_m$ represent the maximum height and length which the waves can attain under the influence of the wind under consideration; $t$ is the time the wind has been blowing, and $a$ and $\beta$ are constants. The data from which Professor Börgen determines these constants are taken from a statement of a French officer, Lieutenant Paris, that during a storm in the open ocean to the east of the Cape of Good Hope, the waves increased from 6 mètres high and 113 m. long on the first day, to 7 m. and 235 m. respectively on the fourth day. But, as the time $t_1$, during which the wind had been blowing before the first day mentioned, is not recorded, the four equations obtained contain five unknown quantities, and therefore Professor Börgen has to seek for another relation, which he finds in the fact that in the open ocean the ratio $h_m : \lambda_m$ lies between 1 : 30 and 1 : 40. Taking the four days at 100 hours, and trying different values of $t_1$, he finds that $t_1 = 10$ gives the ratio 1 : 37·02, which falls within the above limits, and then the values of $a$ and $\beta$ are 1·864 and 13·313 respectively. To obtain an expression involving $w$, the velocity of the wind, he assumes the equations $h_m = aw$ and $\lambda_m = bw$, as being most consistent with recorded observations, and from the expression "a strong gale from the west" in Lieutenant Paris's report, estimates the velocity at 20 to 23 m. per second. This would make $a = \frac{1}{3}$ nearly. If it be taken as $\frac{1}{3}$ exactly ($w$ being about 21·35), $b = 12·34$, and the equations may be written—

$$h = \frac{\frac{1}{3}w}{1 + \frac{1·86}{t}} \qquad \lambda = \frac{12·34w}{1 + \frac{13·31}{t}}$$

Again, in confined waters the maximum height and length of the waves will be modified by the distance of the point where the wind first strikes the water to the nearest boundary lying in the direction towards which the wind is blowing. Professor Börgen, therefore, alters his formula as follows :—

If $D$ be this distance in nautical miles, $\frac{D}{1·94w}$ will be the time the wind takes to reach this boundary ($w$ being expressed in mètres per second), and then

$$h_m = \frac{aw}{1 + \frac{1·94w}{D}\,a} \quad \text{and } \lambda_m = \frac{bw}{1 + \frac{1·94}{D}\,\beta}$$

If these values be substituted in the equations found before, we get

$$h = \frac{\frac{1}{3}w}{\left(1 + \frac{3·62w}{D}\right)\left(1 + \frac{1·86}{t}\right)}, \quad \lambda = \frac{12·34w}{\left(1 + \frac{25·86}{D}\right)\left(1 + \frac{13·31}{t}\right)}$$

Professor Börgen tries to verify these equations by recorded observations, but,

unfortunately, he cannot produce any in which all the data are accurately given, and is obliged to make his own estimates of the values of $w$, $D$, or $t$. His equations must therefore be considered highly speculative. One great source of uncertainty is the various numerical values given by various societies and in different reports to the divisions of the Beaufort scale. To these Professor Börgen adds another series by adopting the reduction formula $w = an + \beta n^2$, where $n$ is the division of the Beaufort scale, and taking velocities of 12 and 30 mètres per second to correspond to 6 and 12 on the scale respectively. This gives the formula $w = 1{\cdot}5n + {\cdot}083n^2$.

The latter part of the paper is devoted to the discussion of periodic variations in wave motion. If a new breeze springs up before the sea has sunk to rest from the action of a former wind, vibrations may be produced having a different wave-length, which, combining with the former, will give rise to a periodic variation in the wave-disturbance. Similar phenomena may also be caused by the repercussion of waves from opposite shores, as in the case of the *seiches* on the Lake of Geneva. Submarine earthquakes and tremors may account for others, and the friction of the bottom in shallow waters.

**Simplification of Time.**—At a meeting of the Geographical Society of Paris, Feb. 21, 1890, a method was discussed by which the present inconvenience, arising from the difference in national time, might be partially removed. The Americans have already divided their territory into zones extending across 15° of longitude, in each of which the time is the same throughout, and differs by one hour from that of the adjacent zones. This system might be extended to the whole globe, its surface being divided into twenty-four parts. Thus, if that of Greenwich be taken as the universal meridian, when it was 2.25 P.M. at Greenwich, the time would be the same as far as 7½° east and west of Greenwich, and it would be 3.25 in the band immediately to the east and 1.25 in that to the west, so that the hour only would change while the minutes would remain the same. But this system demands the recognition of an international meridian, and that of Greenwich, chosen by other nations, the French will not accept. They would be quite satisfied with the meridian of Paris. Of course this system of time would be of no use for astronomical and nautical calculations, but it would be a convenience to railway companies and travellers.—*Compte Rendu*, No. 4, 1890.

**Vertical Zones and Boundary Lines.**—Prof. Friedrich Ratzel has reprinted his *Höhengrenzen und Höhengürtel* from the *Zeitschrift des Deutschen und Oesterreichischen Alpenvereins*. He shows that the limits of snow, trees, etc., cannot be represented by parallel lines at constant heights, for they are not determined solely by latitude and elevation, but to a large extent by local phenomena also. The varying quantity of moisture in the atmosphere and the configuration of the ground will raise or lower the snow-line, and the limits of forest vegetation will be affected by the nature of the soil and other causes.

**Meteoric Dust.**—It will be remembered that the gorgeous sunsets in the autumn of 1883 were supposed to be due to volcanic dust, carried round the world after the eruption of Krakatau. Herr Karl Stolp (*Verhandl. des Deutsch wissenschaftlichen Vereins zu Santiago*, ii. Bd. 1 Heft) believes that this was only one of the causes, and that the appearance of red lights in the sky is often due to the presence of meteoric dust. For, on November 5th, 1883, he collected on the Paso de las Damas some dust, which he affirms cannot, judging from its analysis, have had a terrestrial origin. It fell on the snow, and by scraping away the surface snow from an area of about 12 sq. feet, melting it and evaporating the water, about 31 grains

of reddish-brown powder were obtained. Analysis showed that it was composed of ferric oxide, nickel oxide, silica, magnesium, etc. Elsewhere also Herr Stolp has collected dust of similar composition, but mixed with matter of earthly origin. He considers that his view is confirmed by the observation that the glittering particles seen flitting past the object-glass of a telescope all travel from east to west, when the telescope is at a great height, whereas the particles of terrestrial origin seen on low ground dart about in every direction.

**The Distribution of Petroleum.**—A few months ago M. de Tchihatchef gave a sketch in the *Revue de Deux Mondes* of the geographical distribution of petroleum. M. Hue has estimated the total production of petroleum at 2201 million gallons, of which 1408½ millions are produced in the United States, and 550 millions in Russia. In the latter country, only the wells of Baku are worked, which are the richest in the world (vide *Scot. Geog. Mag.*, vol. vi. p. 49), while in the former petroleum is found in the eastern States and California, over an area equal to that of England, France, and Belgium united. But Russia possesses other deposits in Caucasia which, according to M. Tchihatchef, would, if worked, give Russia the victory over the American supply. Australia and New Zealand yield a considerable quantity; then come British Burma, China, and Japan. Persia is rich in petroleum, but it is not properly worked, and Egypt possesses deposits near the Gulf of Suez. Galicia, Rumania, Italy, and Austria furnish small contributions to the supply, and Germany possesses some rich deposits in Lüneburg.—*Revue de Géographie*, March 1890.

**Table** showing the lengths of miles of various nations :—

| Name of Mile. | Length of Mile in Yards. |
|---|---|
| American, | 1,760 |
| Arabian, | 2,143 |
| Austrian (The Vienna Mile), | 8,296 |
| Danish, | 7,341·15 |
| Dutch, | 6,480 |
| English, | 1,760 |
| Flemish, | 6,869 |
| German, | 8,106 |
| Irish, | 2,244 |
| Italian, | 1,766 |
| Prussian, | 6,480 |
| Roman, | 1,628* |
| Russian (Verst), | 1,167† |
| Scots, | 1,984 |
| Swedish, | 7,341·15 |
| Swiss, | 9,153 |
| Turkish, | 1,826 |
| Tuscan, | 1,808 |

* At one period this mile was calculated as being equal to 2,025 yards.

† Sometimes calculated at 1,337 yards.

## NEW BOOKS.

*The Statesman's Year-Book: Statistical and Historical Annual of the States of the World for the year* 1890. Edited by J. Scott Keltie, Librarian to the Royal Geographical Society. London: Macmillan and Co., 1890.

This the most valuable of all the *Annuals* was started and long edited by the late Mr. Frederick Martin, a journalist of combined English and German extraction, who was for some time secretary to Thomas Carlyle during the preparation of the *History of Friedrich II.*, of Prussia. Under Mr. Scott Keltie's management the volume, now twenty-seven years old, has this year reached perfection as nearly as that is possible. It has been at last reorganised so as to show (1) the British Empire with all its dependencies, colonies, and protectorates; and (2) all foreign countries, arranged in alphabetical order, and including the rudimentary States. By using smaller but clear type, the Statesman's World is set forth in 1128 pages, with index. The excellence of the volume tempts us to be hypercritical, and we make these suggestions to the accomplished editor. India should be submitted to an expert. Aden, page 98, for instance, is credited with the Somal Coast Protectorate and Socotra; but mention is not made of the far more important Protectorate over the neighbouring Lahej tribes, of which the editor will find full details in Aitchison's *Treaties*; nor are we told that Aden is, administratively, a part of the Province of Bombay. Again, on page 114, the Council of India is put at fifteen, and no notice is taken of the Act reducing it to twelve. Zhob Valley was added to British Beluchistan probably too late for this volume. Finally, why do the editor and publishers put such vague and misleading head-lines, and not the principal detail dealt with in each page? We are especially grateful to the editor for his treatment of Africa. There knowledge is brought down to date. For the first time such British interests as those of British East Africa, British Zambesia, Niger District Protectorate, Nyassa-land, and Pondoland appear in an authoritative volume. We miss the comparative statistical tables at the beginning of the former volumes.

*On the Geographical Distribution of some Tropical Diseases, and their Relation to Physical Phenomena.* By R. W. Felkin, M.D., F.R.S.E., F.R.G.S. Edinburgh and London: Young J. Pentland.

The want of a small and concise work, indicating the geographical distribution of the more common Tropical diseases, has been met by the publication of this monogram. As a lecturer on Tropical diseases in the Edinburgh School of Medicine, Dr. Felkin has made himself acquainted with the leading facts bearing upon the subject on which he writes, and his reputation as a traveller gives his work the authority of experience as regards some, at least, of these diseases. The book will prove an excellent introduction to Hirsch's great work, while it provides what the latter does not,—a series of maps, illustrating very clearly the facts mentioned in the text. One almost regrets the author has not given his own definitions to the diseases discussed, but, with the intentionally limited scope of the work, a possible difficulty has been avoided. The book will commend itself, and we wish it success.

*Handbook for England and Wales, alphabetically arranged for the use of Travellers.* Second edition. With Coloured Map. John Murray, 1890.

It is at first sight a little difficult to define the function of this book. As the preface informs us, it is not a gazetteer, because it mentions only places of interest. It is meant chiefly as a guide for tourists; and yet, a tourist going, say, to Devon-

shire would no doubt prefer to purchase Mr. Murray's excellent handbook for that county. Only a few home tourists can make general use of a handbook which embraces all England and Wales. But probably this is just the thing for our American cousins and for foreigners who are trying in a short space of time to "do" the United Kingdom. But for many others the book is undoubtedly useful as a handy work of reference at home, being cheaper and smaller, though much less complete, than a gazetteer. The information given seems accurate and recent, and the two maps are clearly printed and not overloaded with detail. For tourist purposes we much prefer the route system to that of alphabetical arrangement, but no doubt the latter avoids the trouble of consulting an index.

*Les Cévennes et la Région des Causses* (Lozère, Aveyron, Hérault, Gard, Ardèche.) Par E. A. Martel. Avec 140 Gravures, deux Cartes, et neuf Plans de Grottes et d'Avens [Abîmes]. Paris : Libraire Ch. Délagrave, 1890. Pp. 8 + 460. *Price* 5 *francs.*

The "country of the Causses"! Who, except a few geographers by profession and the inhabitants of the Cévennes, know what this is? And it can scarcely be regarded as a reproach to be ignorant of this fact, seeing that until ten years ago the region was almost wholly unknown; and even at the present day it is not known to anything like the extent it deserves. Yet it is one of the most remarkable, one of the grandest and most picturesque districts, not in France only, but in Europe. The word "Causses" is derived from the Latin *calx* (limestone) through a dialect word *caous*. It is the name given to the calcareous plateaux which form the southern declivity of the Cévennes, situated in the departments of southern France that are indicated on the title-page. The region is one which presents many points of resemblance to the Colorado River region in the United States, and also to the great cave districts of Kentucky. Some of its most characteristic features are gigantic fissures from 1300 to 2000 ft. deep, which widen out from 30 yards to $1\frac{1}{4}$ miles; along the bottom flow little streams, fenced in by perpendicular walls of rock often fantastically shaped at their summits. These streams have their sources in the interiors of the sponge-like plateaux; the rain water which supplies them being collected at the bottom of deep circular pits or abysses (*avens*). In many cases their courses pass through magnificent subterranean caves (*cf.* p. 43), which rival in grandeur and strange beauty the celebrated caves of Kentucky or the more recently discovered Jenolan caves of New South Wales. On the plateaux are to be seen some of the most marvellous examples of the sculpture handiwork of Nature in her most capricious moods.

M. Martel's book is a compilation by various hands, and in every way a most excellent production. It combines the respective excellencies of a guidebook, a book of travel and adventure, a descriptive geographical work, a scientific treatise on the geology, flora, etc., of an interesting but little known part of France, and an archæological dissertation on the "finds" from prehistoric ages that have been made in the limestone caves of the southern districts of Central France. Not the least valuable feature of the book are the illustrations, many of them reproduced from photographs. Nobody can turn over the pages and look at these reproductions of the weird, wild, fantastic scenery of this Cévennes region without having his admiration greatly excited, and feeling a strong desire to go and see for himself the marvels here portrayed. There are views of rock and water which remind us of Norway (pp. 41, 49, 52, 211); others which seem like petrified embodiments of the disordered dreams of the genii of Nature, weird or capricious (pp. 91, 118, 121, 157, 159, 161, 173, 188, 191, 213, 291), or beautiful (pp. 55, 99, 171, 179, 247). M. Eiffel's celebrated viaduct at Garabil is depicted on p. 263. Of the

maps we cannot speak in high terms ; the profusion of detail and the absence of delineation in relief embarrass the eye. M. Martel's book can be warmly recommended to intending tourists and others in search of new fields to explore. If only the reality is half what it is represented to be, the visitor ought not to come away disappointed. Full information as to routes, guides, means of access, and such other matters as an intending visitor might desire to know, will be found in the book : a marvel of cheapness, by the way—only five francs (4s. 2d.). But the work is interesting to others besides the tourist : it will please the general reader, it will be highly instructive to the geologist, and will be read with profit by the archæologist and the student of the history of the human race.

*Palestine under the Moslems : a Description of Syria and the Holy Land, from* A.D. 650 *to* 1500. Translated from the works of the mediæval Arab geographers by Guy le Strange. London : Published for the Committee of the Palestine Exploration Fund, by Alexander P. Watt, 1890. Pp. xxii. + 604. Index, Maps, Illustrations. *Price* 12*s.* 6*d.*

The scope of this work can be gathered pretty fully from the title. Mr. Le Strange has collected and translated a great number of the graphic and interesting descriptions of Jerusalem, Damascus, and the Syrian province with which the pages of so many of the mediæval Moslem geographers and travellers abound. For, as a holy city, Jerusalem, in the eyes of the faithful, was only surpassed by Mecca and Medina, and, if the Khalif 'Abd al Malik had had his way, might even have come to supersede Mecca as the religious centre of Islam ; while the green plain of Damascus, as early as the tenth century, was recognised as "one of the four Paradises of the earth." Pilgrims often brought home very detailed descriptions in their "road-books," and many of these are still preserved. How far Mr. Le Strange has exhausted the quarry it is of course impossible to say ; probably there are more manuscripts yet undiscovered. But he has at least done his work well, both in translating and arranging his materials, the collection of which must have entailed great care and labour. His book should prove of value to students of the topography of Jerusalem. His authorities make it pretty clear that the Dome of the Rock—the building accepted by the Knights Templars as the true *Templum Domini*, and on which the churches of the Order throughout Europe afterwards were modelled—was built by 'Abd al Malik in the year 691 ; Mr. Le Strange would identify the substructures at the south-east corner of the Aksâ mosque with the remains of Justinian's church. The Rock itself, "which of old times had stood in the centre of Solomon's Temple"—and from which Mohammed with the angel Gabriel ascended by a ladder of light up into heaven—appears to have suffered from the vandalism of the Crusaders and pilgrims, for Ibn al Athîr states that the Latin kings had covered it with a pavement, because the Franks had purchased pieces for their weight in gold from the priests, till there was a danger of the rock disappearing altogether—much as what is left of the shrivelled skin of Pizarro in the Cathedral at Lima is growing smaller under the fingers of more modern relic-hunters. It is curious to read of the Christians being all-powerful in Jerusalem a century before the Crusades, or of the Holy City's cisterns of olive oil, such as one sees in Southern Italy to-day, or of the large free hospitals of Damascus in the twelfth century, resembling those of Paris a couple of centuries later. But, indeed, the volume is full of attractive matter for those who are interested in the geography and conditions of life in the Holy Land during the Middle Ages, as well as for those also who care more for the legends and marvels retailed by the old chroniclers. The provincial capitals and chief towns are discussed, and an alphabetical list of places in Syria and Palestine occupies nearly 200 pages. There is a map of the

region according with the descriptions of the Arab geographers, and another of Jerusalem and its environs at the time of the Crusades. Finally, an index in English and Arabic letters obviates the confusion that might otherwise have arisen from a system of transliteration that is not always consistent.

*Adventures in the Great Forest of Equatorial Africa and the Country of the Dwarfs.* By Paul du Chaillu. An Abridged and Popular Edition. With Maps and Illustrations. London: John Murray, 1890. Pp. 476.

Most of us think of Mr. Paul du Chaillu's travels in Africa as of ancient history. His expeditions (1855-59 and 1863-65) in the Gabun territory were, however, important of their kind and at their time. He broke new ground in advancing as far as he did into the Interior; he discovered for us the gorilla, and, advancing boldly into its haunts, brought back several specimens of this ferocious animal. His travels took him into the Equatorial forest zone. There he discovered some families (Obongos) of the dwarf-tribes, which are scattered in a chain of settlements across the continent of Africa. It was natural that, on his return, with the marvellous stories he had to tell, a certain amount of incredulity should have been expressed. Indeed, he still remembers, if with no bitterness, the hesitation with which many accepted his narrative. Now that he has been fully vindicated, and that his discoveries have been confirmed and extended, Mr. Paul du Chaillu is able to indulge in his well-earned triumph. Nowadays, the country which he traversed has been carefully explored and mapped by French surveyors; but in his time it was almost a blank.

Mr. Paul du Chaillu's experiences do not suffer by their dramatic and effective representation at his hands. He tells his story well, and from first to last the reader's interest is sustained. His earlier volumes are well worth re-publication in this form. The old illustrations, too, are interesting. But surely the book deserved a better map? The wretched type-block which accompanies it, and the antiquated spellings, are blemishes which are inexcusable.

*The New World of Central Africa.* By Mrs. H. Grattan Guinness. With Maps, Portraits, and Illustrations. London: Hodder and Stoughton, 1890. Pp. 534. *Price* 6*s.*

Mrs. Grattan Guinness has written this book with the worthy object of enlisting wider sympathy and further support for missionary enterprise in Central Africa; she, therefore, somewhat disarms our criticism. But the title of the book is very misleading. The slight geographical information it attempts to give is hopelessly faulty in so many places that, from our point of view, the book may be regarded as of little value. In the main, however, it is an account of missionary enterprise on the Congo. Copious extracts and quotations from other sources of information as well as from private letters contribute to swell the volume. The map is by Stanford.

*Samoa past and present: A Narrative of Missionary Work in the South Seas.* By the Rev. Charles Phillips. London: Snow. Pp. 96. *Price* 1*s.* 6*d.*

This little book deals—from a missionary point of view only—with matters connected both with Samoa and with those neighbouring groups which have been Christianised, mainly by native Samoan teachers, a work for which the great natural intelligence of the Samoans especially fits them. There is nothing very new in the narrative: the remarkable success of these missions, and the rapid change in these little island communities from a dissolute semi-savagery to a civilised and orderly, if somewhat humdrum, existence, has of course been told before. But the interest, both from the romantic and from the philosophic side, seems to invite repetition.

Mr. Phillips quotes with admiration the amount of contributions made by the islanders to the Missionary funds. In one instance it is "a sum which, considering the poverty of the people, is perhaps unsurpassed in the Christian world." Considering the extreme poverty of the people, the absence of trade, the fact stated by the writer that these same people for many weeks together are almost without the means of subsistence, we cannot share his approval—and the less so, seeing that a large part of the money collected is taken away from the island for foreign purposes.

*A Smaller Commercial Geography.* By GEORGE G. CHISHOLM, M.A., B.Sc. London: Longmans, Green and Co. 1890. pp. 208. *Price* 2*s.* 6*d.*

Mr. Chisholm presents this work as mainly an abridgment of his larger *Commercial Geography.* It is an abridgment of the best kind, for the best parts of the big book are concentrated in the little one; the facts and figures are brought up to date, and, most important of all, the voluminous statistical tables are replaced by brief summaries of conclusions. The value of this lies in the difficulty which readers of the class desiderated experience in interpreting the abstract even in rows of figures. The classification of subject-matter is unaltered, and the relative spaces devoted to the principal countries appear also to be the same as in the large book. The habitual thoroughness of the author is evinced in every page, and the book is certain to prove not only useful in schools, but suggestive to practical commercial men. A few years ago a great demand for instruction in commercial geography was believed to have arisen in this country, but there were no books; now there are books in abundance, and of a high order, ready to meet the demand, which, like the fabled Will-o'-the-wisp, seems vanishing into the future.

*Captain Cook.* By WALTER BESANT. "English Men of Action" Series. London: Macmillan and Co., 1890. Pp. 191.

This, like all Mr. Besant's works, forms charming reading, written in that happy style which he has taught us to look for in all that comes from his pen. To write a sketch of Cook's career, to detail his adventures in however slight a sketch, to draw his character, all with the addition of much new matter, is impossible. Materials are wanting, and the peculiar early surroundings of the navigator, his apparent want of personal friends, and the great detail in which his famous voyages have so often been set forth, put very evident difficulties in the way of any one undertaking a fresh sketch of his life and work. Mr. Besant has very little that can be called novel to give us, except in the account of the third voyage of discovery; but his skill in the use of language and grouping and treating of incidents have resulted in the production of a sketch that is worth reading, and reading carefully. It must be said, however, that there are several long digressions which, it seems to us, might have been left out with advantage; trivial or uncertain matters are frequently treated in too much detail, and self-evident facts are insisted upon at length, all taking up considerable space which might have been occupied to more advantage. But the little volume is of great and sustained interest; we have called it charming, and no other word appears so well to describe the latest addition to the "English Men of Action" series. There is a portrait of Cook, but neither index nor map.

*The Success of Christian Missions: Testimonies to their Beneficent Results.* By ROBERT YOUNG, F.R.S.G.S. London: Hodder and Stoughton, 1890.

Ever since the Crusades, the Spanish and Portuguese discoveries, and the formation of the Society of Jesus, Geography and Christian Missions have been closely allied; but by no means happily or fruitfully till David Livingstone arose. *He* changed all that, and now some of our best explorers and most skilled discoverers in Africa at least, missionaries. Mr. Robert Young has done service to science as

well as missions by compiling so intelligently and fully these opinions of experts and eye-witnesses, which cover—the unfavourable, 36 pages ; and the favourable, some 200 pages. Among the authors of the latter are Dr. Samuel Johnson, Sir Walter Scott, Darwin, and not a few of the ablest of the men who have been Governors-General of India and Governors of its provinces. Travellers also are largely brought under contribution, and the effect on the impartial reader is to make him marvel that, even from the commercial and scientific side, any writer should have been found to oppose the missionary and his beneficent work.

## NEW MAPS.

### EUROPE.

**PENTLAND HILLS**, the Pedestrian's Pocket Map of the ——. By John Bartholomew, F.R.G.S. Scale 1½ inches to 1 mile. Showing Public Paths. Price 6d. or mounted on cloth 1s. *Edinburgh : John Bartholomew and Co., The Edinburgh Geographical Institute.*

This map, which is coloured orographically, shows the public rights-of-way over the hills.

**SCHLESWIGSCHEN WESTKUSTE**, Die Seehafen-Projecte an der ——. Mit Benutzung des Materials des Eisenbahnkomitees in Hadersleben, sowie eigener Aufnahmen entworfen und gezeichnet von Paul Langhans. Massstab, 1 : 400,000. Nebenkarten : Aarö Sund, 1 : 200,000 ; die Lister und Römer-Tiefe und der projectierte Römhafen, 1 : 200,000.

*Petermann's Geographische Mitteilungen, Jahrgang* 1890, *Tafel* 10. *Gotha : Justus Perthes.*

### ASIA.

**MEKKA NACH MEDINA**, Die östliche Pilgerstrasse von ——, nach der Beschreibung des Obersten Muhammed Bey of Sadik gezeichnet von R. Kiepert. Massstab, 1 : 1,000,000.

*Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, 1890, *Heft* 2. *Berlin : Dietrich Reimer.*

**CAUCASUS**, Dych-Tau and the Northern Glaciers of the Central ——, from Surveys by MM. Jukoff and Bogdanoff, with additions by Mr. H. Woolley and Mr. D. W. Freshfield. Scale, 1 : 126,720.

*Proceedings of the Royal Geographical Society, May* 1890.

**DIE INSELN DER FLORES-SEE** im ostindischen Archipel. Beitrag zur Berichtigung der Seekarten von A. Jacobsen. Massstab, 1 : 1,600,000. Nebenkarte : Die Landenge zwischen Maumeri und Sikka. Massstab, 1 : 800,000.

*Petermann's Geographische Mitteilungen, Jahrgang* 1890, *Tafel* 8. *Gotha : Justus Perthes.*

### AFRICA.

**UPPER TANA**, Sketch Map of a Journey to the ——. By J. R. W. Pigott, 1889. Scale, 1 : 2,000,000.

*Proceedings of the Royal Geographical Society, March* 1890.

**ZAMBESI RIVER**, Mouth of the ——, Surveyed by Daniel J. Rankin, M.R.A.S., 1889. *Proceedings of the Royal Geographical Society, March* 1890.

**ROVUMA AND ZAMBESI RIVERS**, Eastern Africa between the ——, illustrating the Surveys of Mr. J. L. Last, Leader of the Royal Geographical Society's Expeditions to the Namuli Hills, 1885-87. Scale 1 : 1,450,000.

*Proceedings of the Royal Geographical Society, April* 1890

**EASTERN MASHONALAND,** Map of Mr. F. C. Selous' Routes in ——, 1889. Scale 1 : 420,000. *Proceedings of the Royal Geographical Society, March* 1890.

**ZEILA ANKOBER,** Die Karawanenstrasse ——, und die Grenzgebiete der Somali, Afar und Galla. Auf Grund der neuen astronomischen Bestimmungen von Martini und Paulitschkes, sowie mit Benutzung der im Italienischen Kartographischen Institute in Rom ausgeführten Neukonstruktionen der Itinerare von Cechi, Chiarini, Martini u.a. bearbeitet und gezeichnet von G. E. Fritzsche. Massstab, 1 : 1,000,000.

*Petermann's Geographische Mitteilungen, Jahrgang* 1890, *Tafel* 9. *Gotha : Justus Perthes.*

**CENTRAL-AFRICA,** New Hand-Map of ——. By J. G. Bartholomew, F.R.G.S., showing the Route and Discoveries of Stanley's Expedition, 1890. Scale, 1 : 12,000,000.

*London : Thomas Nelson and Sons, Paternoster Row. Price* 3*d.*

**CENTRAL AFRICA,** Bartholomew's large Map of ——. Stanley's Discoveries correctly Delineated. Scale 1 : 5,600,000. *Price,* 1*s.*

*John Bartholomew and Co., The Edinburgh Geographical Institute. Park Road, Edinburgh.*

## NORTH AMERICA.

**MEXICO,** Karte der Vereinigten Staaten von ——. Nach F. Bianconi. Massstab, 1 : 5,000,000.

*Deutsche Rundschau für Geographie und Statistik, Jahrgang* 12, *Heft* 8. *Wien : A. Hartleben's Verlag.*

**HERSCHEL ISLANDS,** Sketch of ——. From a Survey by the Officers of the U.S.S. *Thetis. Hydrographic Office, Navy Department, U.S.A., March* 1890.

**SAN BENITO ISLANDS,** West Coast of Lower California. From a Survey in 1889 by the Officers of the U.S.S. *Ranger,* Commander F. A. Cook, U.S.N.

*Hydrographic Office, Navy Department, U.S.A., March* 1890.

## OCEANIA.

**OWEN STANLEY RANGE,** Map illustrating Sir Wm. Macgregor's Route to the ——, 1889. Scale 1 : 420,000.

*Proceedings of the Royal Geographical Society, April* 1890.

**GUANO ISLANDS** in the Pacific Ocean. Surveyed in 1872 by the Officers of the U.S.S. *Narragansett,* Commander R. W. Meade.

*Hydrographic Office, Navy Department, U.S.A., April* 1890.

## NORTH POLAR REGIONS.

**OSTSPITZBERGEN UND DIE KÖNIG KARL INSELN,** gezeichnet von Prof. Dr. W. Kükenthal. Massstab, 1 : 1,000,000. Nebenkarte : Uebersichtskizze der von der Geographischen Gesellschaft zu Bremen veranstalteten Expedition nach Spitzbergen, Dr. Kükenthal und Dr. Walter, 1889. Mittlerer Massstab, 1 : 10,000,000.

*Petermann's Geographische Mitteilungen, Jahrgang* 1890, *Tafel* 5. *Gotha : Justus Perthes.*

## GENERAL.

Verteilung des Areals der Kontinente nach Zonen gleichen Küstenabstandes. Entworfen und gezeichnet von Dr. Carl Rohrbach.

Linien gleichen Küstenabstandes von Europa. Entworfen und gezeichnet von Dr. Karl Rohrbach.

*Petermann's Geographische Mitteilungen, Jahrgang* 1890, *Tafel* 6 *und* 7 *Gotha : Justus Perthes.*

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M'Wungu
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Chief Fungwe
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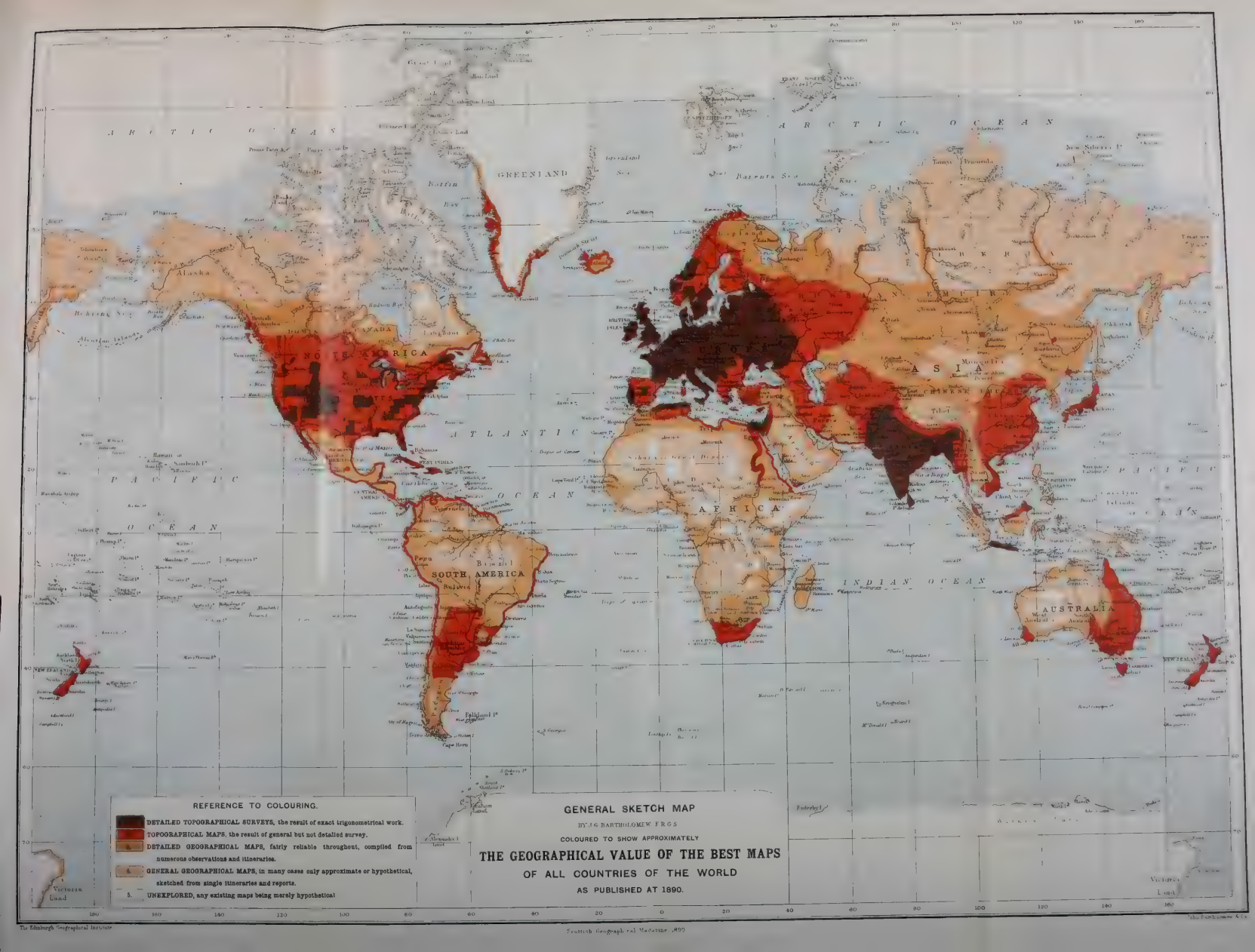
MAP OF
THE STEVENSON ROAD COUNTRY
TANGANYIKA
RUKWA or RUKWA
USAFA
MIWU
UNYIKA
MPORO
UWARAMBIA
NYASA
MAMBWE
NYAMWANGA
URUNGU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1. DETAILED TOPOGRAPHICAL SURVEYS, the result of exact trigonometrical work.
2. TOPOGRAPHICAL MAPS, the result of general but not detailed survey.
3. DETAILED GEOGRAPHICAL MAPS, fairly reliable throughout, compiled from numerous observations and itineraries.
4. GENERAL GEOGRAPHICAL MAPS, in many cases only approximate or hypothetical, sketched from single itineraries and reports.
5. UNEXPLORED, any existing maps being merely hypothetical
GENERAL SKETCH MAP
BY J.G. BARTHOLOMEW F.R.G.S.
COLOURED TO SHOW APPROXIMATELY
THE GEOGRAPHICAL VALUE OF THE BEST MAPS
OF ALL COUNTRIES OF THE WORLD
AS PUBLISHED AT 1890.
ARCTIC OCEAN
GREENLAND
NORTH AMERICA
SOUTH AMERICA
ATLANTIC OCEAN
PACIFIC OCEAN
EUROPE
ASIA
AFRICA
INDIAN OCEAN
AUSTRALIA
NEW ZEALAND

The Edinburgh Geographical Institute
Scottish Geographical Magazine 1890

# THE SCOTTISH GEOGRAPHICAL MAGAZINE.

## THE EMIN PASHA RELIEF EXPEDITION.

### ADDRESS TO THE SOCIETY,

*Delivered in Edinburgh, Glasgow, Dundee, and Aberdeen, June* 1890,

By Henry M. Stanley,

*Commanding the Expedition.*

It is to a Scotchman we are indebted for that beautiful and inspiring picture of a Governor at bay in the far Sudan, defying the victorious Mahdists, and fighting bravely inch by inch for the land which he had been appointed to rule by General Gordon. This Governor was described as a tall military figure, of severe aspect, of rigid morals, inflexible will. scientific attainments—and his name was Emin. This picture became impressed on our imaginations. When another Scotchman, of Argyllshire, asked me if I would be willing to lead an expedition to his relief, so powerfully had the image of the brave Governor—battling against immense odds in the remote heart of Africa, straitened in means, environed by dangers, isolated from his kind—filled my mind, that in a reckless mood I answered in the affirmative. Forthwith came appeals to me from the brave and adventurous and young of these islands, that I would be pleased to associate them with me in the enterprise of relief. They vowed strictest fidelity, obedience to any terms, and utmost devotion, and from among the host of applicants, Major Barttelot, of the 7th Fusiliers, Mr. Jameson, a rich young civilian, Lieutenant Stairs, of the Royal Engineers, Captain Nelson, of Methuen's Horse, Surgeon Parke of the Medical Department, Mr. Jephson, Mr. Troup, Mr. Ward and Mr. Bonny were enrolled as members of the expedition to relieve Emin Pasha, Governor of Equatoria. Had our means only been equal to our

opportunities we might have emptied your barracks, your colleges, your public schools—I might almost say your nurseries—so great was the number of applications to join in the adventurous quest.

The route resolved upon was that from Zanzibar westward, *viâ* the south end of Lake Victoria, through Karagwé and Ankori and south-west Unyoro to Lake Albert; but about thirteen days before we sailed the King of the Belgians, through his generous offers of assistance, induced us to change our plans. The advantages of the Congo route were about 500 miles shorter land journey, and less opportunities for desertion of the porters, who, in the neighbourhood of Arab influences, are unable to withstand the temptation of deserting. It also quieted the fears of the French and Germans that behind this professedly humanitarian quest we had annexation projects. After undergoing all the fatigues of the journey across the western half of Africa, and returning by the eastern half, as regards the choice of route, I say with the utmost deliberation that, had we been sent out seven months previous to January 1887, the Congo route was by far the best; but it happened that, unaware of the changes transpiring even at our departure, we were fated to travel over a region devastated and converted into hungry forest solitudes, in traversing which we were subjected to the most hideous sufferings and privations that ever befell a caravan in Africa. Despite the devastation, however, had I been permitted to follow my own plans, we should still have been able to pass unscathed by the terrible havoc wrought in our ranks by hunger and disease, for with our flotilla of boats we should have been able to have reached within 60 miles of the Albert Nyanza.

Having despatched 200 loads of rice inland, and purchased pack and riding animals for the march through East Africa, we had to recall the provisions and sell three-fourths of the animals.

In my various speeches and lectures since my return from Africa I have done my best to remind my audiences of the services of all those to whom we should justly be grateful. When I employ the personal pronoun, it is to be hoped that you will understand that my companions, white and black, are always included, especially the British officers and the Zanzibaris, without whom no relief or rescue of Emin would have been possible. But there is a party not yet mentioned in connection with our expedition, about whose services we have been singularly silent. Through a strange oversight I have hitherto neglected to say a word. I refer to Sir William Mackinnon and his associates of the Relief Committee, who contributed the funds, about £16,000, which made the relief possible. Three-fourths of the contributors were Scotchmen. Among them are Mackinnon of Balinakill, Bruce and Younger, of Edinburgh, Denny of Dumbarton, Peter Mackinnon, John Mackinnon, Duncan MacNeil, James Hall—all pure Scotchmen. I ought to mention poor Edmund Mackenzie, the son of Sir William Mackenzie, who worked with might and main to equip the expedition, and got it ready for embarkation by the time myself and companions reached Zanzibar. The Relief Committee, among whom are Sir Lewis Pelly, Colonel James A. Grant, the companion of Speke, and Sir Francis de Winton, should also be

remembered, even in a brief address, when every minute is most precious. I am proud to acknowledge their services, and most happy that their unabated confidence in us was so thoroughly justified.

Four days after our arrival at Zanzibar—that is, on February 25th—we set sail for the mouth of the Congo River on board the steamship *Madura*. On the 18th of the following month we dropped anchor at Banana Point. The next day, though we had not been expected before the 25th, we moved up river with 680 men and about 160 tons of cargo, and the day after the remainder of the 800 men who formed our expedition followed us. The force consisted of 11 whites, 623 Zanzibaris, 62 Sudanese, 13 Somalis, and two Syrians, and accompanying us were Tippu Tib and 96 of his followers, to whom we had promised free board and passage from Zanzibar to Stanley Falls in consideration of his promise to supply the expedition with 600 Manyuema carriers to assist in the transport of ammunition to the Albert Nyanza for the beleaguered Governor of Equatoria. I need not detain you with the account of the march to Stanley Pool, 340 miles from the sea, nor of the voyage of over 1000 miles up the Upper Congo to a place called Yambuya, at the foot of the rapids of that name in the Aruwimi River, because you ought to have a fair idea of that up-river passage and the scenery of the Congo from former addresses of mine.

Owing to want of sufficient accommodation on the steam flotilla of the Congo State at that period, we were obliged to leave about 130 of our people at a place called Bolobo, a hundred miles or so above the Pool. Consequently Major Barttelot and Mr. Jameson were instructed to wait at Yambuya until the Bolobo contingent could be brought up; then, if Tippu Tib had sent his porters, a rear column amounting to nearly 900 people were to follow our track, which, according to the instructions, would be made known to them by blazings on the trees. If Tippu Tib did not send porters, as was likely enough from former breaches of contract, the commander was to do the best he could with his own men, about 270 all told.

Before leaving Yambuya let us see what we knew of Emin's intentions at that time. Junker, who had lately left Emin, and whom I met at Cairo, gave me the following notes about him :—

"Emin Pasha very short-sighted, great linguist, no fighter, but good administrator, is very prudent, doubtful about seven years' pay due to him. Only six steamers visited his province during his governorship. The last news was very discouraging about him. His people deserted more frequently. Garrisons of four northern stations in revolt. When invited to withdraw, to consolidate, insolently declined, and expressed their intention to march northward. When he told them he had a letter from Nubar Pasha, they charged Junker with having forged it. At Wadelai the Pasha has only 200. If there is a break-up, and Makrakas return to their own country, he proposes to retire upon Kibero and seek refuge with Kabba Rega. Junker believes Emin Pasha will return with us, unless he is asked to stay. Greatly discouraged, he says, Egypt does not wish us to stay, and Europe takes no interest in us. Of what use would it be to stay? Junker is positive that sight of expedition will cause

general desire of all to return with us. A few faithful Makrakas might possibly remain with him if he expressed intention of remaining. Proper thing to do, he suggests, would be to send some one to replace Emin, who is much reduced owing to anxieties and poor nourishment. Emin has eight principal stations, garrisoned by from 200 to 300 in each, probably 1800 regulars all told. Constant defections and sickness weaken this force daily. When I arrive there will be 1000 all told."

The latest news received by us before starting was that Emin was imploring help before being overwhelmed, that he was debating with himself as to which route would be best for him to retreat by, whether by Monbuttu Land, Masai Land, or Usongora, and Tanganika. but that, prevailed upon by Mackay, he had at last become convinced that it would be best to remain until he received orders.

That you received later letters giving different views of his position, does not alter the conditions under which we set out.

On the eve of our departure from Yambuya we were filled with a belief that there was urgent need of relief, and having despatched couriers from Zanzibar overland to announce our coming to Emin with indications of the point of our emergence from the west, we were strengthened in our purpose by a belief that a grateful Pasha with a grateful army would be anxiously expecting us, with their minds made up either to renew the struggle against Mahdism, or to retreat towards civilisation.

In debating within myself as to what distance the forest we were about to enter would extend inland from the Congo, it never entered my mind that we should find, at this altitude, a duplicate of that of the Amazon. For in 1876, while in the Uregga forest, the Arabs of Nyangwé had spread about a rumour that behind the forest, some weeks' march, was grass land with cattle, which suggested to me that perhaps two weeks', at furthest a month's, march would take us to a lofty pastoral upland, similar to that which I found to exist between Lakes Victoria and Muta Nzige, when of course, once having found a good path, we could swing along at the rate of from ten to fifteen miles per day. We therefore entered it with confidence, forty pioneers in front with axes and bill-hooks to clear a path through the obstructions presented by the tangle of underwood and lianes, praying that God and good fortune would attend us, and believing implicitly that our errand was noble and commendable.

Meantime, an instinctive sense that the Albert Nyanza will never approach nearer to us, and that the object of the expedition will ever remain unattainable unless we employ physical and mental powers to shorten the distance, drives us on, solemn as the prospect is before us. Day after day, week after week, from dawn of morning to near eve, with a noon interlude of rest, we are urged on unrestingly. Step by step we gain our miles, and penetrate deeper and deeper into that strange conservatory of nature, the inner womb of a true tropical forest. The warm vapours rise from it as from a great fermenting vat, until so dense are the exhalations in a few days, that only the flaming bolt can let in the sunlight through that impervious and endless foliage above our heads. After a month's unbroken march we halt for rest, and for the first time attempt to question the natives, who have hitherto artfully eluded our efforts to gain

intelligence. We ask them if they know of any grass land lying east, north, or south of their district, and they reply in the negative, in a manner that seems to imply that we must be strange creatures to suppose that it would be possible for any world to exist save this illimitable forest world. Taking a grass-blade from the river bank—for only a few straggling blades can be found—we held it up to view. "What, no field, no limited stretch of land with something like this growing"? "No," they reply, shaking their heads compassionately, pitying our absurd questions; "all like this," and they wave their hands sweepingly to illustrate that all the world was alike—nothing but "trees, trees, and trees!"—great trees rising as high as arrow shot towards the sky, uniting their crowns, interlacing their branches, pressing and crowded one against the other until neither sunbeam nor shaft of light can penetrate it.

No sooner are these words heard by our men than their imaginations conceive the forest under the most oppressive and forbidding aspect. Hitherto it had been a tract of land of uncertain extent, growing trees which a few weeks' march would enable us to pierce through, a mere pleasant variation in the experience of an African journey-maker; but a month had already elapsed and they now heard with their own ears that the forest was without end. The little religion they knew was nothing more than legendary lore, and in their memories there dimly floated a story of a land that grew darker and darker as you travelled towards the end of the world, and drew nearer to the place where a great serpent lay supine and coiled round the whole earth. "Ah! then the ancients must have referred to this, where the light is so ghastly, where the woods are endless, and are so still, and solemn and grey; to this oppressive loneliness amid so much life, which is so chilling to the poor distressed heart;" and the horror grows darker with their fancies: the cold of early morning, the comfortless grey of dawn, the dead white mist, the ever-dripping tears of the dew, the deluging rains, the appalling thunder-bursts, and the rolling echoes, and the wonderful play of the dazzling lightning. And when the night comes with its thick palpable darkness, and they lie cuddled in their little damp huts, and they hear the tempest overhead, the howling of the wild winds, the grinding and groaning of storm-tost trees, the dread sounds of falling giants, and the shock of the trembling earth which sends their hearts with fitful leaps to their throats, and a roaring, and a rushing as of a mad overwhelming sea—oh, then the horror is intensified!

It may be that the next morning, when they hear the shrill sounds of the whistle, and the officers' voices ring out in the dawn, and the blare of the trumpet is heard, and there is stir, and tumult of preparation, and action, that the morbid thoughts of the night, and memories of terrible dreams, will be effaced for a time; but when the march has begun once again, and the files are slowly moving through the woods, they renew their morbid broodings, and ask themselves, "How long is this to last? Is the joy of life to end thus? Must we jog on day after day in this cheerless gloom and this joyless duskiness, until we stagger and fall, and rot among the toads?" Then they disappear into the woods, by twos, and

threes, and sixes; and after the caravan has passed they return by the trail. some to reach Yambuya and upset the young officers with their tales of woe and war; some to fall sobbing under a spear-thrust; some to wander and stray in the dark mazes of the woods, hopelessly lost; and some to be carved for the cannibal feast. And those who remain, compelled to it by fears of greater dangers, mechanically march on, a prey to dread and weakness. The scratch of a thorn, the puncture of a pointed cane, the bite of an ant, or the sting of a wasp, the smallest thing serves to start an ulcer, which presently becomes virulent, and eats its way to the bone, and the man dies. These sores rage like an epidemic, and dozens are sufferers. Then, the recklessness with which the men eat up their stores of provisions! What might have lasted ten days is eaten up in two or three, and they starve the rest of the time; for the spaces between the banana plantations may be only a day's march, but they may be twenty days'. It requires a calamity to teach blacks, as well as whites, how to live.

On the eighty-first day of the march from Yambuya we come across a community of ivory-raiders from an Arab station called Kibongé, on the Lualaba. We leave fifty-six of our sick people with them, to be boarded for money. Seventeen days later we leave Captain Nelson with fifty-two men who are unable to travel unless they get a supply of food. We select six of the most intelligent men, and despatch them as avant-couriers to another Arab settlement to obtain relief, but they lose their way, and the expedition arrives after thirteen days' subsistence on fungi, wild fruit, and wood-beans, at Kilonga-Longa's; but there is nine days' further delay before we can induce the brutish-minded ivory-raiders to send off relief. Finally, after twenty-five days' starvation at the camp, Mr. Jephson reaches Captain Nelson, to find only five skeletons surviving out of fifty-two. Many have died, many have deserted, many have been wandering for days in search of food, and have not returned.

At Kilonga-Longa's we are obliged to leave Captain Nelson and thirty-eight sick men, and Surgeon Parke to attend to their ailments, and we resume the march again with sadly reduced numbers. Though, when men are sodden with despair, preaching is useless, not a day passes without an effort being made to lift them out of their brooding sullenness. We point out the robust ivory-raider and say that we may be like them, hearty and strong, if we pay heed to advice, and take care of our rations until we get out of the devastated land. We tell them that there is one remedy for it, and that is to press on through the accursed wilderness, to bid good-bye to grief and want. And the day came at last, after infinite patience, when we were well-nigh exhausted with our troubles, that we reached Ibwiri, the site of Fort Bodo. Here we rested for thirteen days to recuperate, and to repair the waste of the wilderness; and the effect was such that most of the men increased in bodily weight by over a pound per day.

At this place the natives told us they had seen a grass-land five days' journey further east, and this revived the men; but it was twelve days before we came to the end of the forest: on the 160th day after leaving Yambuya, we filed out of the gloom into the light of

broad day shining over one of the loveliest lands we had seen. We raced gleefully, like little wanton children in spring, over the soft young grass; we stared at the great burning sun; we gazed in wondrous delight at the careering waves of green grass as the wholesome wind swept over it; we went into raptures over the billowy contours of the land, and the thin winding lines of boscage between them; and our surprise was equal to that of the herds of game whose domains we had invaded, and who snorted their alarm. We were 173 persons all told remaining out of 389. Out of the 216 we had left we might pick up 50 of those we had left behind, perhaps less. We had no time, however, to think of anything but the present, and I doubt whether there were anywhere happier people than we were on that day as we swung forward over the grassy downs, leaving the doleful shades behind us.

The nearer we drew towards the lake, the more warlike the natives seemed to be. It was no longer the lying in wait behind a log, a stump, or a tree, to stab with a spear, or to give a knife-thrust, or drive the poisoned dart; it was springing towards us in fighting mobs, the bravest in the front, all uttering their war-cries and encouraging one another with noise. On the 11th, 12th, and 13th December we had to meet new tribes, or sections of tribes, each of which imagined it was able to effect what their friends were unable to do. But despite their most frantic efforts, we finally reached the verge of the table-land, 5200 feet above the sea, and looked down on Lake Albert, about 2800 feet below us, and about six miles away.

The hope had sustained us during our journey fron Zanzibar to Lake Albert, that Emin Pasha, upon receipt of information from the Consul-General and myself, would proceed in his steamer a four days' voyage to the south end of the lake, and warn the natives that he expected some friends; but on arrival at the edge of the lake we were sorely disappointed to find that for ten years no white man or steamer had been seen on it, and yet we had arrived on the 14th December, which was one day earlier than that on which he expected us.

After staying two days, and perceiving that no expedition could subsist near the lake—as these shores were only occupied by four fishing villages, the natives of which, besides selling fish, eked out a livelihood by washing out the salt from the bed of the receded waters, and selling it to the natives of the table-land for grain—we turned sharply about and returned to Ibwiri, where we built Fort Bodo. Lieutenant Stairs was despatched to Kilonga-Longa's with 100 rifles to escort Captain Nelson and Surgeon Parke and the convalescents and our boat, and after having performed that mission successfully he was sent to Ugarrowwa's, nearly 200 miles back, to escort twenty couriers with letters and charts to Major Barttelot, and to bring such men as were recovered to us.

Our fort having been completed, and about ten acres of ground cleared and put under corn, beans, and tobacco, we set out a second time to Lake Albert, on the 2d April 1888, but on this occasion we conveyed our steel boat. On the 20th of the month we received a letter from Emin Pasha. It was dated the 25th March. It said that, hearing of the rumours of our having been on the lake in December, he had just

returned to Tunguru from an unsuccessful quest of us, and he asked us to stay at Kavalli until he could come to us. We could not help smiling at the idea of our staying five or six weeks at a place in Central Africa until news should drift to him by accident. As such a course would have been suicidal to men while in the full swing of action, and hearts throbbing with the desire to accomplish their mission, the boat was launched on the waters of the lake, and Mr. Jephson and a gallant boat's crew set out to find the object of our quest.

Now, *à propos* of the date of this letter to us, on our return to Zanzibar, we found that Emin had written to *Petermann's Mitteilungen*, a letter which he concluded with the strange words: "If Stanley does not come soon, we are lost."

I give this as an instance of vagary in human nature. The why and wherefore it is not for me to say. Another is Emin's letter to his Government, which we received: "Help us quickly, or we perish." But after the expedition has started inland, he sends a letter to a friend which reads proudly thus: "If, however, the people in Great Britain think that as soon as Stanley or Thomson comes I shall return with them, they greatly err. For twelve long years I have striven and toiled, and sown the seeds for future harvest—laid the foundation-stones for future buildings. Shall I now give up the work because a way may soon open to the coast? Never!"

Another instance is when he signs an engagement to enter the German service on February 3d, but continues to hold out inducements to the British for a month longer that he will serve with them.

A few days after Mr. Jephson's departure a steamer called the *Khedive* made her appearance, and in the dusk, amid a scene of wild excitement, Emin Pasha, Captain Casati, and a few Egyptian officers were conducted from the beach to my tent.

Until the 25th of May, our respective camps were close together, and we daily met, and chatted about various things. The topic as to whether he would stay in Equatoria or accompany us to the coast naturally came up for discussion frequently. But from the beginning to the end of our first meeting, I was only conscious that I was profoundly ignorant of his intentions. On some days, after a friendly dinner the previous night, he held out hopes that he might accompany us; but the day following he would say, "No: if my people go, I go; if they stay, I stay." For ten days I assented to this, but it became impressed on my mind, or rather I surmised, that he had an objection to go to Egypt, because he might be shelved, and his life would be wasted in a Cairene or Stamboul coffee-house. The ideal Governor whom I had imagined had been altogether replaced by a man who had other views than those of his Government. What those views were I could not gather, for, as has been observed, the impression of one day was displaced by that of the next, and his real opinions upon any topic save an abstract question were too transient to base a conclusion upon. Thinking that his objections only applied to leaving Africa, I finally, after about a fortnight with him, said: "I see, Pasha, that you don't like the idea of going to Egypt. What do you say now to a continuation of your appointment here as Governor, with the rank of General?"

"How?"

"Well, my first duty is to the Khedive, you know. He suggests that you retire with me to Egypt. But you evidently do not admire the idea, and from what I gather from you, your troops entertain the same objection. As I only came to serve you, it is for you to state whether an appointment here would best meet your wishes. In the event of your resolve to stay in Equatoria, because of your attachment to your troops and province, I have been requested to offer you the post of Governor here, with the rank of General, pay of £1500 and a subsidy of £12,000 per annum.

"Ah, indeed—under whom?"

"Under Leopold II., King of the Belgians."

After expressing his opinions at certain length, he replied: "No, Mr. Stanley, I have served the crescent flag for thirty years, and I cannot change it for the blue flag and the golden star all at once."

"Well spoken, Pasha!" I replied. "You have quite made up your mind upon the subject?"

"Quite, and we will say no more about it."

"Very good, Pasha. Now listen. I have one more proposition for you. Cast your eyes upon that letter which the Foreign Office handed to me among others before I left, in order that I might thoroughly understand your position. In this letter you offer your province and your services to the British."

"They had no right to publish my private letters thus. I think it is a shame."

"I beg your pardon, Pasha. These letters are not public. They are printed for those they were intended for, and it was thought necessary to enlighten me respecting the object of our expedition. Now, assuming that you are certain to decline Egyptian aid which we have brought to you, that you equally decline the offer of King Leopold, I have another proposition to make to you on my own responsibility entirely."

"What is that, I pray you?"

"That you take service with a British Company, as foreshadowed in your letter to Sir John Kirk. I propose that you remove from the Province and accompany me to Kavirondo, on the north-east of the Victoria Nyanza. I will undertake that the natives shall receive you and your troops. We shall assist to build a fort or two, and after seeing you all comfortable and provided for, I shall hasten to the coast, send you a caravan with further supplies, and will then proceed to England to form a Company, which shall accept you and your troops with the same pay and rank as you possess now; and I feel sure I shall succeed."

"Ah! that is something like an offer. Indeed, I am most grateful, because it is precisely what I should wish, and meets every objection; for my troops, so far as I know, only dislike going to Egypt, and if they are contented with it, I shall be most pleased. But can you guarantee this?"

"No; I can guarantee nothing. I can only promise that I will do my best to make the project a success, and the conditions mentioned will be included."

"Well, I am delighted with it. If you will let Dr. Parke stay with me, as a witness of what my troops say, you will be better convinced of the truth of what I say."

"Dr. Parke is our only surgeon, Pasha, and we need him every day; but if you only require a witness, why will not Mr. Jephson suit you?"

"Very well, then, let it be Mr. Jephson. He will be able to report to you on your return to us what he has seen."

A few days after this the Pasha sent the commander of his troops and his head clerk to me, but you may imagine my astonishment when, as soon as they were seated, they poured the most violent abuse on the Pasha. They declared that he was the most consummate liar they had ever known. Considering what liars Arabs are, I thought that they were greatly exaggerating, and I asked if the Pasha was aware of their sentiments. "O no, he would cut our heads off if he knew that we are telling you this; but we all want to leave this accursed country. We are tired of our life here. The Pasha will perhaps tell you differently, but he has the most crooked ways with him, and none of us can believe a word he says. All he cares for are beetles and butterflies," and in this strain they continued for quite an hour.

All this made no impression on me, further than showing that if such sentiments were general, the condition of things in Equatoria could not be a very happy one.

About the third week of our stay on the Albert Lake, the major and officers of the 2nd Battalion arrived from Wadelai, and were formally introduced to me. Agreeably to a suggestion of mine, the Pasha turned to the commanding officer and said pleadingly, "Now promise me, before Mr. Stanley, that you will give me forty soldiers to garrison this new station."

The 1st Battalion had been in revolt eighteen months, and the Pasha was a fugitive from their vengeance, and here to my very face was he pleading to the 2nd Battalion. Yet externally the Pasha was still the Governor, obeyed and treated as his rank and authority deserved, but underneath treason and rebellion fermented, and Emin was either unconscious of it, or dissembled so well that all I could venture to say to myself was that the whole was very extraordinary.

Towards the latter part of May we left him, and Mr. Jephson in his company. Officers and soldiers saluted us, and up to the last moment the Zanzibaris thought that he was a great and powerful Governor, while my thoughts were busy trying to piece this thing and that in order to get a reasonable solution of many things. Nevertheless, the Pasha impressed us all as an amiable and accomplished gentleman. We set out firmly believing that on our return we should find the Egyptians collected on the little island ready for departure homeward, and the Pasha firmly established under more promising auspices with his faithful Sudanese troops in the Equatorial Province.

On arrival at Fort Bodo, the station was discovered to be in a most thriving condition. Lieut. Stairs had returned from Ugarrowwa's with only fifteen out of fifty-six sick men; three had been killed by natives, thirty-seven had been as good as starved to death by Ugarrowwa.

Invalid farming with Manyuema had turned out to be as bad as baby-farming in England. After eight days' rest we proceeded on the back trail to hunt up the twenty couriers and the rear column, and on the eighty-second day from the Albert Lake we appeared before Banalya, a stockaded village about ninety miles east of Yambuya, to learn that instead of following our track, the officers of the rear column had elected to wait at Yambuya for the promised contingent from Tippu Tib, who had induced them, by repeated promises of immediate compliance with their wishes, to defer their departure.

Ten months after the date that we, in the advance column, thought that they would start, they had departed from Yambuya. But in the meantime one hundred of the people of the rear column had perished, and thirty-three had been left behind. Mr. Jameson had travelled 1200 miles to obtain the Manyuema contingent. Major Barttelot had personally travelled 800 miles, and yet the second day after the Major's arrival at Banalya, from paying an eighth visit to Stanley Falls, he was assassinated by the very people he had travelled so far and sacrificed so much to obtain. When I came to muster the remnant of the rear column, I was short of 169 men. Of the remaining 102 not sixty men were in fit condition for travel. Out of five competent, mature British officers, only one was left. Out of 600 loads of goods there were only 230 remaining, and I personally had nothing left but the rags I had come to seek the rear column in. It would serve no useful purpose to relate what other things met our eyes and grieved our ears in that pestilential den at Banalya.

On the 20th of December, 1888, we burst out of the forest on the edge of the plantations of Fort Bodo, and by nine o'clock the volleys of the rifles woke up the garrison at the fort to the fact that after 188 days' absence we had returned. What a difference there was between the admirable station and model farm-like appearance of Fort Bodo and its fields to the terrible scenes of Banalya! But there was one mystery yet remaining. The Pasha and Mr. Jephson had promised to visit Fort Bodo within two months after my departure, say, about the middle of August: it was now past the middle of December, and nothing had been heard of them. But the cure of all doubt, grief, misery, and mystery is action, and therefore we could not remain passive at Fort Bodo. We allowed ourselves three days' rest only, and then set out for Lake Albert for the third time.

On the 17th of January 1889, when only one day's march from the Albert Lake, a packet of letters was placed in my hands: they were from Emin Pasha and Mr. Jephson. There was a long account from Mr. Jephson stating that he and the Pasha were prisoners, that they had been arrested by revolted troops of the province, the day after we had found the foundered rear column—that is, on the 18th August. There were some expressions in Mr. Jephson's letters which put a very desperate aspect on his case. "If I don't see you again, commend me to my friends." The Pasha also seemed to think that nothing could be worse than the outlook, for he specially recommended his child to my care. Now, reading such words a month after they were written was not very assuring.

However, I picked up a crumb of comfort in the fact that Mr. Jephson said he could come to me if he were informed of my arrival, which I decided was the best thing for him to do. Accordingly, an imperative message was sent to him not to debate but to act, and like a faithful and obedient officer he stepped into a canoe, and came. And after shaking hands and congratulating him upon his narrow escape from being a footman to the Emperor of the Sudan, I said, "Well, sir, speak. Is the Pasha decided by this what to do now?"

"To tell you the truth, I know no more what the Pasha intends doing now than I did nine months ago."

"What, after nine months' intercourse with him?"

"Quite so; not a bit."

"Well, who is going to take charge of this ammunition? It was not brought for rebel soldiers, but for the Governor, and if the Governor is a prisoner, and cannot, or will not, say what he will do, I shall have to blow it up, and start home."

It was not long, however, before the mystery that had struck me the year before was cleared up. The Pasha had been deceived by the fair-spoken, obsequious, Egyptian and Sudanese officers, and through his good-natured optimism we had been deceived. They had revolted three times, and had refused to obey any order he had given them. This was the fourth and final revolt. As early as 1879 Gessi Pasha had drawn General Gordon's attention to the state of affairs in Equatoria, and had reported that, immediately the communication with Khartum had been suspended by the closing of the upper Nile by the *sudd*, the want of discipline had been such as to cause anxiety. In 1886 the Pasha had fled from the 1st Battalion, and, until his imprudent resolve to take Mr. Jephson amongst the rebels, had held no communication with them. The 2nd Battalion, also, only performed just such service as pleased them when he condescended to coax them, while the irregulars would of course follow the majority of the regulars. This much was clear from the narrative, written and oral, of Mr. Jephson. It was corroborated by the strange request of the Pasha in May 1888: "If you please, now promise me, before Mr. Stanley, that you will give me the forty soldiers he says are necessary for this station."

I resolved to try once more and ascertain what measures agreeable to him I should take. Did he wish an armed rescue, or was it possible for him to do anything such as seizing a steamer and following Jephson, or marching out of Tunguru where he was a prisoner, to meet me outside of the fort; or had he quite made up his mind to remain a prisoner at Tunguru until the rebels would dispose of him? Any way and every way, if he would only express a definite wish, we vowed we should help him to the uttermost. I wrote to him a ceremoniously polite letter to that effect, for I was warned that the Pasha was very sensitive.

While my letter was on the lake, being conveyed to Tunguru, matters were settled in quite an inconceivable fashion at Tunguru station. The rebel officers had sent a deputation to the Pasha to ask his pardon, and to offer to reinstate him in his governorship. The pardon was readily given; he declined yet a while to accept the governorship. They asked

him if he would be good enough to accompany them to pay me a visit and introduce them to me. The Pasha consented, embarked on board the steamer; the refugees likewise crowded on board the *Khedive* and *Nyanza*; and on the 13th February the two steamers had approached our camp, and two days later the Pasha and rebel officers reached us.

According to the Pasha, the Mahdist invasion, the capture of four stations, and the massacre of many of their number had cowed the rebels, and they were now truly penitent for their insane conduct to him, and every soul was willing to depart out of the Equatorial Province at least, if not for Egypt. The officers now only came to beg for time to assemble their families. Agreeably to the Pasha's request a reasonable time was granted, and they departed. The Governor thought that twenty days would be sufficient; we granted a month. At the end of thirty days the Pasha requested another extension; we allowed fourteen days more. Finally, at the end of forty-four days, not one officer of the rebel party having made his appearance, we broke camp, and commenced our journey homeward with 570 refugees, consisting of a few Egyptian officers, clerks and their families; but on the second day an illness prostrated me, which permitted them twenty-eight days more; and yet, after seventy-two days' halt, only one person had availed himself of our offer.

On the seventy-third day since my meeting with the rebel officers, four soldiers brought a message stating the rebels had formed themselves into two parties, under Fadle Mulla Bey and Selim Bey, and the party of the first-named had seized all the ammunition from the other party, and had fled to Makraka. Selim Bey, unable to muster resolution to follow us, preferred to remain to curse Fadle Mulla Bey and his own folly; and what the end of these misguided and unprincipled men may be, no person knows outside of that unhappy region. Whether Selim Bey preferred to follow Fadle Mulla Bey to Makraka and submit to him for his superior talents in dissimulation, or whether in attempting to follow us he was overtaken by Kabba Rega's force and destroyed, can only be idle speculation. Their fate, however, only proves the truth of the Greek saying, that whom the gods wish to destroy they first make blind; for such blind and unreasonable specimens of humanity I never met in the whole course of my experience.

You know that we departed from that region finally on the 8th of May 1889, and that by the 5th December, in a period of 210 days, we had marched 1400 miles, and that out of 570 refugees we succeeded in escorting Emin Pasha, Captain Casati, Signor Marco, and 291 of their followers safe to the Indian Ocean. You know also that a few days before reaching the coast, we were welcomed, and most hospitably entertained by the German officers in East Africa, and that, on the very first evening of his introduction to his countrymen, the banquet given in our honour terminated in an unfortunate accident which well nigh proved fatal to the Pasha. You will be glad to learn, however, that since the latter part of February, the Pasha has been busy writing his book, and arranging his entomological and ornithological collections, and has started for the land lying between the Tanganika and the Victoria Nyanza, to annex those regions in the name of the German Government.

During these wanderings from Banana Point on the Atlantic Ocean to Bagamoyo on the Indian Ocean, which lasted 987 days, we travelled over 6000 miles. 1670 of these miles measure our tramps to and fro in the twilight of the great Central African Forest.

Let me show you a glimpse of it. One of our officers always spoke of it as a bush. He had been in New Zealand. But it was not a bush, or a jungle, or any kind of tree-covered tract such as is known to people of the temperate climes. It is 224,000,000 acres in extent. This island of Great Britain is about a fourth of the area. Imagine then a space of earth four times the size of England, Scotland, and Wales, crowded with colossal trees mainly, from one to five feet in diameter and 200 feet in height, with their strata of thick glossy foliage so interlaced that the hot, glaring sun of the tropics is quite shut out, and each tree seemingly lashed to the other by endless lengths of numberless cables, ranging from the tender thread-like creeper to the thickness of the old hempen hawsers of a line-of-battle ship, and these presenting such a maze of curious festoons, loops, and slack ropes, such confusing meshes and utmost disorder, that frequently they remind you of a fleet of ships in a dock on which the riggers have been playing tricks with the ropes and halyards. And underneath the thick impervious shades is the impenetrable undergrowth, often of such close growth that you fancy you could travel best above the tops, rather than through it. Imagine the forks of each tree crowded with little conservatories of orchids and ferns, and the great horizontal limbs burdened with grey-green lichens with leaves as large as prize cabbage, and drooping growths of epiphytes, or air plants, and hosts of tendrils with their delicate points swinging ceaselessly about, and here and there great swaying walls and nodding towers of vines, around the flowers of which the wild bees hum, and the fierce wasps dart, and brilliant butterflies sail in myriads. And on every bole, and stem, and root, creeper and liane coat thickly dark-green moss beaded with dew. Let the ground be fat and black like rich hot-house soil; let the vines be of the greenest, and the wrinkled bark of the giant trees and their parasites be of the greyest; let the air be suffocating; let the vapours rise in blue clouds, to thinly veil the six-fathom-thick foliage above; let the murmur of the insects above, below, and around be heard, indicative of the seething life that finds existence in the hot, damp shades! Then imagine yourselves dazed and mazed in this weird shadow-land, and marching from dawn to dusk in a perpetual duskiness, lit at rare intervals by a little ray, or the flickering dust, of sunlight: and you will have a dim idea of the forest of Darkest Africa.

But you must take a broader view to comprehend its vastness, and its terror to houseless wanderers. You must think of the great rivers, the Aruwimi, the Wellé Makua, the Lindi, the Lira, the Lowwa, and Lulu, rolling down in dark-brown volumes to the Congo, hundreds of miles, each winding north and south across a degree of latitude as they flow westward, and each fed by never-ceasing rains—absorbing countless streams from either bank—Stygian dark in colour, either coursing impetuously through the murmuring depths of the forest, or lazily oozing from under floating beds of lilies, pistia, and duckweed, while the sickening

sweet odours are almost overpowering. In a day's march we would cross over several streams; once we crossed thirty-two in a ten-mile march—three creeks, rivers, or rivulets per mile. The rain came after bursts of thunder, displays of dazzling lightning, and raging tempests, and lasted from four to fifteen hours, with such copious falls that it drowned the land. Day and night round about us great trees fell, or parted with their branches. Once a hoary old patriarch that must have weighed twenty tons fell within a yard of our boat, and created a wave that almost capsized us.

People this great tract with small tribes dwelling amid the *débris* and wreck of mighty woods, from ten to thirty miles apart, in absolute ignorance that there can exist any world but their own, possessed of such a mania for meat that no animal life is rejected. Human flesh is as much sought after as is the flesh of beasts in this country, though fortunately it is protected by dangers to the hunters. But by craft, superior boldness, or accident, victims are often secured, and serve to satisfy depraved appetites. We were compelled to bury our dead in the river, lest the bodies should be exhumed.

While we live beneath the dark shades in the chilly gloom of a sepulchre, and fancy ourselves the only inhabitants, the foliage above—more towards the light—may be haunted by birds of gay plumage, such as the parrot, cockatoo, turaco, and sun-birds; ibis are screaming; the fish-eagles call shrilly to their mates; the divers and kingfishers are by the river-side watching for their finny prey. A family of chimpanzees may be reposing in connubial bliss; troops of great and small monkeys may be at gymnastics; legions of bats may be crooning placidly after a repast; or halted within sound of our voices may be a troop of monstrous elephants, or a herd of buffalo; frequently ground antelopes may be seen rising suddenly, lifting themselves out of the ground just where a man was about to step.

In the more easterly parts of the forest we find several tribes of the primeval race of man—the pigmies. They range from the Ihuru River to the Awamba Forest at the base of Ruwenzori. We found two distinct types: one a very degraded specimen, with ferrety eyes, close-set, and an excessive prognathism, more nearly approaching what one might call a cousin of the simian than was supposed to be possible, yet thoroughly human; the other was a very handsome type, with frank, open, innocent features, very prepossessing. We had considerable experience of both. They were wonderfully quick with their weapons, and wounded to death several of our followers. The custom in the forest is to shoot at sight, and their craft, quick sight, correct aim, and general expertness, in addition to the fatal character of the poison of their arrows, made them no despicable antagonists. The larger natives of the woods, who form the clearings and plant immense groves of plantains, purchase their favour by submitting to their depredations. When they are successful in the chase or trapping, a fair trade is made between the pigmies and the brown-bodied planters.

We have seen some superb figures among the little people, as perfect from the knees upward as a sculptor would desire, but the lower limbs

are almost invariably weak and badly-shaped. They are quick and intelligent, capable of deep affection and gratitude, and those whom we trained showed remarkable industry and patience. One old woman, 4 feet 2 inches in height—possibly the ugliest little mortal, at least so we thought at first, that was ever in our camp—exhibited a most wonderful endurance. She seemed to be always loaded like a camel as she followed the caravan from camp to camp, and I often had to reduce a load that threatened to bury her under her hamper. Cooking-pots, stools, porridge paddles, kettles, bananas, yams, flour, native rope, a treasure of ironware, cloth, or what not, everything was placed in her hamper as if her strength was without limit. Towards the latter part of our acquaintance I was able to make her smile, but it had been terribly hard work, as she was such an inveterate scold. By her action she seemed to say: "You may beat me to pulp, you may load me until you smother me with your rubbish, you may work my fingers to the bone, you may starve me, but thank goodness, I can still scold, and scold I will until I drop."

We had a pigmy boy of eighteen, who worked with a zeal that I did not think possible out of civilisation. Time was too precious to waste in talk. On the march he stoutly held his place near the van, reaching camp he literally rushed to collect fuel and make his master's fire. His mind seemed ever concentrated on work. When I once stopped him to ask his name, his face seemed to say, "Please don't stop me: I must finish my task," and I never heard his voice while he was with us, though he was not dumb.

Another of our pigmy followers was a young woman, of whom we could honestly say, whatever you may think of it, that she was virtuous and modest, though nude. It was of no use for any stalwart young Zanzibari to be casting lover's eyes at her. She resolved that she had duties to perform, and she did them without deigning to notice the love-sick swains of our camp. Her master's tea or coffee were far too important to be neglected. His tent required her vigilant watchfulness. Her master's comforts were unspeakably precious in her eyes, and the picture of the half-naked pigmy dame, abjuring frivolities and rendering due fidelity and simple devotedness, because it was her nature to, will remain long in my mind as one of many pleasing things to be remembered.

We have no time to touch upon any of the remarkable features in the grass land, except upon the most singular of all, Ruwenzori, or the Mountains of the Moon; for from their slopes ceaselessly fall the dropping waters from melted snows, which are the source of the Albertine Nile, which feed Lake Albert Edward, supply the Semliki River, and meet the Victoria Nile from the east in Lake Albert.

How these immense snowy mountains could have remained so long hidden from intelligent explorers is a mystery. According to every ancient account, from Homer down to the beginning of the present century, they have been located, faithfully enough for all practical purposes, by tradition; but though within the last twenty-five years Sir Samuel and Lady Baker, Gessi Pasha, Mason Bey, Emin Pasha, Captain Casati, our own officers, had been within 50 miles of them, they had

remained unseen; but suddenly, in view of a thousand pair of eyes, after we had resided nearly a month at one camp, the snowy range was seen in all its splendour of white raiment, topping a magnificent blue-black mass of lengthy mountain, while we stood spell-bound and wondering.

If you were to imagine an island 100 miles long and half as many wide suddenly arising within view of Scottish shores, over 18,000 feet in height above the sea, clothed half-way up with splendid primeval forests, the upper portion capped with pure white snow, you would understand something of the awe and the delight with which we gazed upon this wonderful revelation from the Unknown. Some of you, I dare say, have seen the Bernese Oberland as visible from Berne, and if you have, a picture of Ruwenzori is not difficult to conceive as it presented its northern outline and contours to us.

The valley west of it, through which the Semliki winds, embraces about 3000 square miles, and is one of the most prolific tracts in the world. Its central portion is covered by a very aged tropical forest, wherein a host of natives have made clearings, in which flourish the most wonderful growths of plantains and fat luscious bananas that the most favoured parts of the globe can show. Five battalions might have been easily supplied with provisions, so that for once old Africa was seen in perfection by our long-enduring column of wanderers.

To the south of the valley is found Lake Albert Edward, in the midst of wide, grassy plains, which occupy what was once covered with the waters of a spacious inland sea. Until within the last ten years, these plains were remarkable for the hundreds of herds of a hornless breed of fawn-coloured cattle; but the guns supplied to the king of Unyoro by bands of deserters from Emin Pasha's province have enabled him to almost exterminate the cattle, and to break up the interesting pastoral tribes which possessed the land.

Once we cross east longitude 30° we are out of the zone of perpetual rains, and the region eastward is subject to six months' drought and six months' rain.

Most imperfect, no doubt, you will deem this lecture, but my aim has been mainly to rouse your curiosity. The books that will be published within the year will satisfy every natural desire to know the truth about Emin and his province, and sufficient details of the strange new lands traversed by our expedition will be furnished. Meanwhile, pray remember that, since I arrived at the Indian Ocean last December, I have not been able to call one hour not devoted to sleep my own. I am hungry for my rest and my holiday; but I thought that the Royal Scottish Geographical Society, having assisted our expedition with a sum equal to that furnished by the wealthier and older Society in London, deserved my visit. It is a matter of deep regret to me that I have been unable to give you something more worthy of the sincere friendship I entertain for many of your members.

# A VOYAGE INLAND FROM CANTON.

By Dr. W. G. Dickson.

We left Canton at midnight, April 10th, 1861. In making preparations for our trip we found a general indisposition among the native merchants and tea-men as well as the *compradores* to in any way further our object. Every suggestion was made to dissuade us from going, by denying facilities and interposing obstacles. Our inquiries as to mode of transit ended in our determining to go in one of the large boats, called *lo-lung-shoone*, used for bringing cargo to Canton from Lokcheong, in the district of Hwuy-chow on the east side below the Bogue forts. The various hitches which occur in coming to a settlement with Chinamen (especially if unaccustomed to deal with foreigners), generally hinging on dollars, having been overcome, we started with a crew of thirty men at midnight, and arrived at Fatshan, about twelve miles up, at five A.M., the men poling all the way, with such shouts as materially to interfere with sleep. The understanding was that we were to be taken to Lokcheong, over 300 miles, for 150 dollars.

The morning was wet and the tide against us, and after waiting till 12.30 we again started. No examination was made by the custom-houses, of which one belongs to the Hoppo for exports, and the other to the Kwang-chow-fu for imports. We went up the branch which passes along the north face of Fatshan, and which meets the branch of the river passing behind Fatshan by Samshan, Fengchow, Akungmiu, Shekwan, and Loong-tsune. The little hill of Wang-tsay-kong stands at the tongue formed by the junction, and on the north side is the village of Shahow. At about two-thirds of the way stands the village of Wongteng-szu—one of the Yamuns of the six *szu* into which the Namhoi-yune is divided. The *yamun* was very small, but the seat of office and the seals were there. About the door were several criminals chained by the neck to stones, lounging about and talking to the other villagers. The village is prettily situated at a bend of the creek. From the opposite side of the creek the boys saluted us with the usual Canton abuse and oaths, but knew well that they were out of reach. At Shahow the surrounding country seemed devoted to the cultivation of the mulberry, but it afterwards appeared to be entirely confined to near the river. On asking the men, however, at the station, they said that a great deal of new ground had during the past few years been converted into mulberry ground. The high price of silk during the past few years had brought about this change. The natives of this part of the country do not appear to do more than cultivate the mulberry. We could not ascertain whether they have the silk-worm; but they sell either the leaves or the cocoons to the people of the Shoon-tuk district. The mulberry plant is planted out in rows at a distance of 4 feet between each row —between the rows are planted ground-nuts. The leaves are plucked five times a year; none of the plants seemed higher than two feet; the plant is cut down before winter. There is not the same style of

cultivation in the neighbourhood of Kumchok and Kowkong, where the ground is dug out into trenches or ponds and thrown up in ridges; these are utilised as fish ponds and pay very well.

The river is confined by a bank of twelve to fourteen feet high. The paddy-fields on the side seemed below the level of the river. Two months before, in February, the creek along which we passed was dry. At that time the tide rose three feet; in April the tide does not reach this point. We passed Tsy-toong on the left side, and a little after Typeen on the right, and came to Seoo-tong, a neat, clean, and wealthy-looking village about fourteen miles from Fatshan—where the men, as they had had no sleep the previous night, stopped. After Fatshan we had no tide with us, and the stream seemed to run down at about two miles an hour. There is a pathway all along the bank. At Seoo-tang there were large rafts of wood ready to be floated to Canton. We started at six A.M. in a raining and drizzling mist. We passed Seinam, seeing only the roofs of the houses on low ground, and shortly after sighted the elegant nine-storied pagoda of Samshuy-yuen, with the city at a short distance. Here we passed a custom-house, for which our boat-people made some preparations by mysteriously passing into the hold below the cabin two damp-looking bags, and afterwards coming and asking Mr. B. to say, if the custom-house officers came on board, that it was salt for our own use—two piculs of 266 lbs. for ten days! We passed Mokemeentow, where there is a custom-house. The forenoon being rainy and the near foreground alone visible, we were unable to get a view of the range of hills which separates the north and west rivers; but, as the weather improved at two P.M., we landed at Nam-kong—a very prettily situated village.

On walking across the country, it appeared to be of the same granite, barren, formation as is found in the neighbourhood of Macao or Kowloong, the only cultivation being carried on in the hollows, in which a more mixed and more soluble soil may be found. At this bend, where the river turns north-east for about five miles, is the village of Szu or Wong-tong, where the soil must be a good clay, to judge from the numerous brick-kilns. Similar kilns, however, had been passed all the way from Shekwan and Tung-chow. The banks here were strata of sandstone interlaid with slaty bands. The bricks were being sent down to Whampoa and Sunchow—several granite stones lying on the river bank, apparently for building a temple, came, we were told, from Hong-kong.

The district of Szooy was on our left side—Samshui on the right. Boats were passing carrying salt, salt-fish, rice, wood, paper; some were going up to Weitsap, occupied last year by rebels, which is noted for its fine bamboos for making combs, opium pipes, etc., the wood being sent down to Tyelaong and Shimtuk. This is on a branch of the river coming from the west and the borders of Kwangsi. We pushed on to reach Loopow at night: the hills on both sides were still distant. The country, especially on the Szooy side, is low and flat with trees and villages—more undulating and higher, but not so rich, on the Samshui side. We did not pass up the main, but a smaller and shallower, branch of the river. The depth

of the branch we were on was said to be six feet—of the main branch twelve feet. The river was then high, but must at times rise to a much greater height. The *bund* or towing-path all along had been about twelve to eighteen feet above the water—there were still some mulberry plantations to be seen. Anchored below Loopow, we fired an evening gun to warn thieves, and again restored our two piculs of salt, which seemed to give their possessor infinite thought and anxiety. He would gain about two dollars by this transaction which gave him so much thought and risk.

At 5 A.M. we started again, and found we had been lying about a mile from Loopow. This is a substantial-looking village with a handsome custom-house, and the apparatus of the native douane—custom-house boats, numerous cruisers, etc. Numerous boats were lying in front of the town, some *lo-loong* like ours, others carrying tea and dry cargo, and many having a small white flag to show that they had a pass to carry salt up the river. A great deal of salt seems to go into the interior. It is of a coarse, impure, description, containing much of the many ingredients found in sea-water. There seems no reason why salt from Europe should not be sent into the interior, except that Chinamen on the coast, at Tamshuie and Hainan, can manufacture it so cheaply as to undersell any that has to pay so large a freightage; and it must always be borne in mind that a dollar is a dollar to a Chinaman, and he will not pay 1000 cash for good salt if he can get what he has been accustomed to for 999, even if an impure article.

This custom-house was established some years ago (?), at least so far as duties laid upon tea and imports were concerned, and is complained of as being one of the heaviest between Canton and the pass.

The north and west rivers never seem to coalesce into one. Samshui, near the apex of the delta, means "three waters," and there are probably more branches. The branch upon which Canton stands is a comparatively small portion of this large river.

The reason for the establishment of a custom-house at this point is that a branch of the north river diverges here and comes down through the Samshui district and by Shekmoon to Canton. It is a shorter route, but is often in summer too shallow for traffic.

At Loopow the river is half-a-mile wide, and said to be 12 to 14 feet deep at present. Resting there for a short time to lay in a supply, and distribute a few *Illustrated London News*, we started again. The current increased a little in force; the men pulled and poled away most steadily and patiently. We passed the village, or *szu*, of Sui-kong in Samshui within touching distance of the trees on the banks. Here the banks were for a couple of miles very pretty—banyan trees, bamboos, fields of peas and vegetables surrounded by hedges, and a numerous and curious population.

As we go up, the low, flat, country gradually gives way to hills coming down to the river edge. On the right bank we came to Tytong-hue. At Tytong-hue the river was *more* than 16 feet in depth, and it was 5 feet deeper three days before. After the rains of June the water is much higher, covering the neighbouring fields. In winter it falls to

3 and 4 feet. At Samshui and at Tsing-yuen-hap it is very shallow at the mouth and very deep in the gorge. Between Tytong-hue and Kai-p'ai-hue, on the right bank, we saw white smoke coming out in jets nearly 700 feet up the hill. We were told that men were making charcoal, but there seemed to be very little wood. Another man told us they were burning limestone, which, from the situation, seemed possible. A little further on I observed men bringing down in wheel-barrows stone excavated from the hill. We were unable to land to examine the rock. Limestone is brought down in large quantities (burnt) from Tungoan, on the western river in the prefecture of Sheoo-hing.

We anchored about 1½ miles below Shekkok, which gives its name to the prominent pagoda on a hill on the right bank of the river. We now left Samshui and entered the district of Tsing-yuen.

Monday the 15th broke cold and bleak, with a strong north wind blowing. The men made several attempts to get away, but as the direction was north-easterly we were driven on to the sandy bank, and finally the men said they could not proceed. We saw a prominent hill at a distance of about 6 or 7 miles—like a rock with a green top. We took advantage of the day and the stoppage, and walked across country to it, passing through the village of Shekkok, or Stony Cape, which stands at the projecting corner on the left bank of a bend of the river. This was market day, and the village, about a mile in length, was full of people busy trading, pigs and geese seeming to be the staple articles of exchange.

We then struck off for our object. Some mulberry is still grown here, but the immense floods which take place during the June and July rains keep everything in a poor, sand-covered state. The rise of the water must be very great, to judge from the widespread sand-covering of the fields, the washed-away appearance of the walls of the houses, and the broken banks. Between Shekkok and Shunshek (the rock we were going to) there is a succession of low hills of a gritty barren soil, disintegrated granite of a coarse nature, the quartz being in large pieces, but the more soluble portions being washed into the hollows, which alone were cultivated. There were few trees except the usual stunted firs; buffaloes were seen all about, but no cattle or horses or sheep or goats. We followed the green slope of the hill to the top, and were soon up on a shoulder of it, and here we found a piece of information which we had received at starting correct, to wit, that we could not get to the top. We had seen a grave on the top, and concluded that where a grave had been placed we could go. But on the shoulder we stood, and staring us in the face was a perpendicular rock 200 feet high. There was black trickling water—a green bank on the top—the appearance of a grave—but a deep gulf between the black rock on which we stood and the black rock opposite held out no hope of our doing what Chinamen had done before us. This rock on examination was an immense round granite boulder fully 200 feet high and 700 or 800 yards round, on the south side rather overhanging. On the north side we found that steps had been cut in the granite rock to the top. These were only shallow nicks, and as a strong wind was blowing there was no great temptation to risk

coming down again. We found on our return that the "Old Dragon boat" had moved up only 200 yards, and found the wind too strong to proceed further. Here geese, pork, fowls, eggs, and, we were told, milk may be got, and abundance of lucifer matches were to be obtained in the market.

The next morning the wind had subsided, and the day was fine. The houses seemed in many cases to be only neat sheds, which we supposed to be necessitated by the sudden rise and fall of the water. Whenever we spoke of the depth of water, the water-people asked as to the prospect of steamers coming up. Unfortunately we were not in a position to ascertain the depth of the water, as we crept along by the shore, but from the third to the seventh month,—*i.e.* generally from April to August—the river is very high. The same day we passed a temple in ruins, which one of our party immediately pointed to as symptomatic of the iconoclastic spirit of the rebels. A man, however, who was standing by, on being appealed to, said it was washed away by the river, though it is 14 or 15 feet above the present water-mark. Indeed the whole country around presented evidence of having been overflowed and sand-covered.

The rebels had, two years before, occupied the country on the right bank, the village of Santong, and the country around. A river here enters the north river below Tsing-yuen city. A pagoda of nine stories marked our approach to the place. It is the principal city of the county of the same name, and stands on the right bank of the river, for two miles along the water's edge. Our course lay close along the opposite shore. The river appears here 700 yards broad, and is a fine sheet of water; above the city it widens, and at the same time becomes shallower.

Hitherto through the delta we had been approaching hilly country. That afternoon we passed good native carts, and in the evening three men passed us, one carrying among other traps a sword. They told Mr. B. that they had just come down from Hoonam, that the rebels were stirring there, and were moving on to Pingshek, in Eecheong, and that the people were all moving over the hill into this province. We suspected they were of the rebel party. They had been eight days coming down on foot. Next morning a boat passed us which had left Canton nearly three days after we did. We were much struck by the little notice taken of us by the natives. They all resemble closely the lower orders of Canton city; we did not, I think, see a moderately good-looking female, and none of the sex there adopts the small-foot style. We reached a village, Shatoy, at 7 P.M., close to Pak-meoo (the custom-house at the mouth of the *hap* or gorge). This village, with Pak-meoo, had been burnt entirely by the rebels in 1854. At Pak-meoo the houses are all new, and there is a good large custom-house. Resting here for the night, we entered the gorge at 6 A.M. It extends for about six miles between fine hills. Half-way through it there is the Feeloy-szu, a monastery beautifully situated in a pine wood on a small stream which falls over some fine rocks. The temple and gods were destroyed in 1854 by the rebels, who occupied the building for some time. Pikkwei, late Governor of Canton, gave a liberal sum to restore it; while we were there workmen were repairing the buildings and the gods. The opposite bank of the river, at a distance of about 300 yards, is also

covered with pine wood. At a height of 600 feet above the road stands the temple of Feeloy-szu, from which the monastery takes its name. There are easy steps all the way up, and the whole walk amply repays the trouble of the ascent. Here we replenished our water-cask with excellent water, but up to this point none really good was to be got, and the river was very muddy. The whole gorge, but especially near the temple, resembles a good deal the entrance to the harbour of Nagasaki.

We passed, on the left bank, Pa-kong-how (name of a parish of Tsing-yuen). At the upper end of the pass large sand-banks have formed, making the river shallow. Our boat drew $2\frac{1}{2}$ feet, and yet the men got us aground close to the bank.

We passed Wong-shek (or "yellow rock") on the right bank, a village or street with the towing-path in front of it. The principal article of cultivation here seems to be the bamboo, of which long groves line the bank. These are said to be principally for the Sheokwan market, where bamboos are not much grown. Rafts of timber were floating down. Charcoal boats, lime-kilns, and stone brought from Ying-tuk were constantly passed.

On the right bank of the river all was in ruins, the result of the rebel movement in 1854 and 1857. There are only small houses or watch-towers, with three cones for making signals by fire, and these are unable to hold any number of men or make any defence. Two small walls with embrasures at one prominent part of the river, about 2 miles above Wong-shek, were all that was to be seen in the way of artillery defences.

The country was well wooded, with a cottage or hamlet here and there along the banks in the wood; few or no travellers or passers-by were on shore. We anchored below Tye-meeoo, a temple at the mouth of a narrow opening, formed by a rugged ridge of granite hills crossing the line of the river from east to west. Here we entered the county of Ying-tuk. Deposits of sand make the river shallow above this narrow. Bamboo plantations lined the water-side; but the recent rise must have been as much as 10 or 12 feet, judging from the straws adhering to bushes on the banks.

We passed the village of Wang-to-hang on the left bank, where we saw four ponies, but, though a man told us there were plenty in this part of the country, we saw no more. About 2 *lee* above this village is the meeting of the waters from Leenchow, Leenshan, and those from Lok-cheong and Namhoong up which we were moving. Small boats only can go up to Leenchow. The cotton from the Leenchow district is valued in Canton for making beds and mattresses, as from its elasticity it will after long use, on being pulled out and put in the sun, be as elastic as when new.

These districts border upon Kwang-si and Hoonam. They were overrun by rebels in 1857, but are thinly populated, and Leenshan especially, principally by Miaotsze, or aborigines, who have remained uninfluenced by such civilisation as surrounds them. The rebels, who had attacked Pingshek, came down the river from Leenchow in the summer.

Immediately after passing this junction we entered the Mang-tze-hap, a fine pass in the hills of a different character from the Tsing-yuen-hap. The right side of the river is precipitous, with perpendicular rocks with

little vegetation on them. One monumental-looking rock, standing by itself on the hill-side, was called Tseung-koon by the captain. The towing path is on the opposite side, where the hills, though steep, are not so precipitous. There appears, however, to have been at a former time, and perhaps is still, a path along the face of the rocks (probably alluded to by Barrow), as in many places we observed that the inequalities were built up with stones. But in some places along the ledge of the rock the path was very slight, and, considering the nearly perpendicular rocks and the depth of the water, with the swiftness of the current, somewhat frightful for a man carrying two chests of tea. The river seemed about 150 yards in width, and is said to be very deep. It was more than 20 feet deep near the side.

Emerging from the Mangtze-hap we entered, without any widening of the river, the Ching-yeong-hap. Not so precipitous as the Mantze, the sides of the hills are visible to a greater height, and the whole was a scene of the grand mixed with the pastoral, if such a scene as the pastoral is to be found in China. Towards the upper end of the pass was a hill named, from its resemblance to the bird, the Nga-in-shan or Swallow Hill, and for such a large representation of so small an object it was by no means so far-fetched as many similar names.

The rocks in the centre of the pass appeared to be of granite, at the upper end to be of a hard greywacke. A board in the middle of the pass stated that it was 15 *lee* from Leenchow-how and 15 *lee* to Polo-hang ahead. Shortly after we emerged from the pass the pagoda of Ying-tuk came in sight, over the bank at a distance of 18 *lee*. On the right bank of the river the range of hills we had passed stretched away to the west and north-west, and on the low ground between these hills and our position rose several detached, precipitous, bluish, rocky hills at short distances from one another. On approaching these we observed upraised lines of stratification. These are one of the sets of limestone hills from which the supplies we passed are drawn. The Maantowshan is a sugarloaf-shaped hill rising out of the right bank of the river to a height of 350 feet, with cliffs of bluish limestone tipped with bright green vegetation up to the top. We crossed the river and went up to the quarries. The rock is very close-grained and hard, and is broken out in flattish pieces of a foot square to suit the piling up in the kilns. The adjacent village of Lo-tee-wan was the scene of a visitation of the rebels in 1857, and most of the houses were ruins. Wheel-barrows are used for conveying the stone to the shore. Some pieces of rhomboidal quartz were lying about.

We anchored at the opposite bank (left) about 6 *lee* from Ying-tuk. The men in the quarry earned 1 tael 2 mace a month and their food, or about 6s., and seemed comfortable and intelligent. They spoke a northern dialect.

We reached Ying-tuk, on the right bank, at 7 A.M. A pagoda stood upon the opposite bank of the river, of nine stories, which appeared to me of only eight, but they are never of even numbers. On coming up to the city, the county (Hok-kong) or temple of Confucius, is the first building, approached by a flight of steps from the water's edge.

Adjoining the temple is a *muntap* of three stories high. In the north I have found these little pagodas on the river utilised as lighthouses. The houses stretch along the top of the bank, none close to the present water's edge, and are generally perched upon high pillars, showing to what a height the summer rains raise the water level. The town has a clean and substantial look. Rising above the houses is seen the city wall, new-looking and in good order. Three of the gates are prominent objects from the river, the S., E., and W. The breadth of the city proper, from east to west, does not appear above half-a-mile. It had altogether a very pleasing effect, with the outward cleanness of the houses and the walls, the fine trees within the walls, the broad smooth river in front, the two pagodas with a third small monument on the top of a hill, the grotesque limestone hills at the back, and, in the distance, the fine range we had passed through. We here laid in a supply of fowls, pigeons, pork, fruit, etc., exchanging Mexican dollars for 1200 cash, each in Canton equal to 900 cash. The people had a substantial look about them. The city was not taken by the rebels.

We noticed at the water's edge some rocks strangely marked with smooth horizontal lines, which the geologist of the party explained as an exemplification of the action of glaciers even in this hot part of the world, and pointed out the elevation of land which must have taken place. A Chinaman standing by, with his hands behind his back, seeing our attention intensely arrested by this splendid geological phenomenon, pointed out to us that the lines were made on this hard limestone by the towing ropes of passing boats. Opposite the city the waters from the county of Yonng-yuen come into the river, a stream of 150 yards width, navigated by long shallow boats. Passing up about 2 miles the village of Mawo-meeshek, "Cats' Eyebrows rock" stands on the left bank (our right), and then the rock or hili of Koonyum-ngam appeared in sight.

Mong-fookong, the rock of Koonyum-ngam, abuts on the river, from the back low ground sloping up to a pinnacle, from which a perpendicular rock drops into the river of 500 feet or upwards. On coming abreast of the rock its height is not appreciated till the diminutive appearance of the boats and men at the foot of it strikes one. These boats lie off an opening between the slanting strata of which the rock is composed. Beyond this opens on the sight a most picturesque temple, built on a ledge in the rock about 30 feet above the present river level. We went to the opening in the rock, and on nearing it found that the upper part was crossed by red boards with large gilt characters, and going nearer still we saw steps leading to the interior, and found several boats, large and small, lying off the entrance. As we came up to the steps the cavern seemed to give forth its inmates by tens at least. When we began to grope our way up the narrow steps we could hardly pass for the crowd, and a priest came down with a candle to escort us up. On gaining the first floor we found a table and several young fellows in anything but a devout frame of mind drinking and playing, and flickering candles moving to and fro in the back of the cave. The sounds of revelry and mirth were resounding through this dark, blackened cavern,

recalling descriptions of pandemonium. On the first floor was a joss, and on ascending a narrow stair in the front, and looking out on the river, was a figure of Koonyum. "Good words" and sentences were cut all over the entrance. The cave itself had been pared away by the chisel. Some huge stalactitic masses were hanging directly in front. The cave seems to be formed by the overlying of two strata which do not meet exactly. We soon satisfied ourselves: and, leaving this dark and blackened hole—(blackened partly by candle smoke and partly by a fire two years ago which consumed what woodwork was in it)—we went round in the boat to the temples. These were remarkable only for the extreme prettiness of the situation. Perched on a ledge on the front of this high rock, white, and built in the Chinese style of roof and gateways, with a few bushes of a bright green on each side, the whole thing seemed, with the deep, dark water gliding slowly by, like a painted toy upon a painted river. The whole scene was striking. Coming up to it expectation is raised; abreast of it one is not sure that it is realised; leaving it one feels satisfaction with the imagery and beauty of the whole thing.

We walked along the bank again, passing every now and then military stations or *sonn*, all without exception in a state of ruin, recent but complete. These consist of a little house or tower about 20 feet square, with three openings, one above another, on the wall fronting the river—the uppermost a sort of loop-hole, the middle a sort of look-out hole, while the lowest may be called a window. At a short distance from this building stand three sugarloaf-shaped things ten feet high—these contain fireplaces and are said to be for making signals. The rebels in every case had displayed their animosity by destroying these towers.

We anchored at Loong-tow-ying. Previously we ascended one of the numerous limestone hills which are dotted over the level country. The ascent was difficult, the rocks sharp, the sides steep, with little or no soil. At the foot of the hills was undulating meadow ground, with a farm-house here and there, and again we saw small carts drawn by bullocks. These were simple enough—the wheels were solid, and on a framework was a strong basket.

Through the upper part of the county of Ying-tuk the limestone gives way to sandstone, the scenery is softer, the hills are undulating and green, the villages embowered in trees (not the banyan)—the *Cunninghamia lanceolata* grows, but never to a large size. The people, apparently, are very similar to those about Canton; the dialect differs, but is understood by any one who knows Cantonese. During this day, 20th April, the heat was very great, so that we could not leave the boats till five P.M. During the morning partridges were frequently heard calling on shore.

In the afternoon we passed Ty-hang-how, the small stream running past being the boundary of Ying-tuk, Kwang-chow-fu, Sheoo-chow-fu, and Hok-kong, the county in which Sheoo-chow-fu city stands.

The river now became shallower and narrower. That night we anchored in the middle of the stream. The moon was in its first quarter, and, though warm, the evening was most enjoyable, which may in part have arisen from the absence of mosquitoes. There had been no rain

for a fortnight or upwards, and the river was low. The fields on the banks were not yet turned up after the last year's crop of paddy. Good roads, here made of rounded water-rolled stones, run from village to village. The cry of the partridge was heard close at hand night and morning, yet, often as we walked on shore during the day and evening, only one was put up. The cock pheasant was occasionally heard. A snipe rose here and there, but the country did not appear, on the whole, to be thickly stocked with game.

At 2 P.M. we came in sight of Pak-to on the right bank, apparently a village of some importance, from the number of mandarin boats stationed off it. A custom-house seemed in full operation. An official came off (nominally) to present the respects of the Hok-kong magistrate; he said he had been 200 *lee* down the river; but, not seeing our flag, had passed us. We only hoisted an English flag when approaching any place where officials might be expected. An old square pagoda (off the straight) stood here. Opposite this village a river comes in from Mapa; a little above on the left bank are the limestone cliffs of Ka-pong-shan, with several caves, one of which is memorable as the residence of a famous hermit.

The following day was very hot, and kept us to the boat nearly all day. Every mile similar boats to the one we travelled in passed us—said to be bringing down *ma*, *i.e.* flax or hemp. We could hear nothing more of rebels but every hamlet showed evidences of their presence during 1854 and '57; and a general frightened demeanour among the people was probably the effect of terror arising from their being the victims of the cupidity or the wrath of both parties. We walked along the outskirts of a village, and saw five or six children from three to six years of age at play. They did not see us till within thirty yards, but, when one gave notice, they all glided out of sight, and on coming up we found the whole of the little party with most anxious faces crouching in a ditch beneath some ferns, as if they were wild beasts instinctively hiding themselves from their natural enemies. The poor little things, with upturned faces, between tears and hysterical laughs, could hardly be induced to rise up.

That afternoon, between Tyhanghow and Kai-tan, we saw the first trace of coal. The jagged hills had partially given way to smooth, rounded, undulating country—the sandstone had been reached. On the side of the hill we saw bluish, slaty-looking, rubbish thrown out. This turned out to be old attempts to strike good coal strata when some poor stratum had cropped up. Nothing had been done here for ten years. After this we saw the same marks of the existence of strata, but too poor to pay for working. We anchored off a hamlet said to be a dépôt for coal, but we had no opportunity of visiting it.

Next morning, Tuesday 23d, at ten, the boats along the bank became more numerous. As we approached the lower custom-house of Sheoo-chow-fu, at Ho-sei-mee, a custom-house officer came on board. We showed him all our documents, viz., our consular passports countersigned by the governor-general, a letter from the governor-general to officials in the province, and a document from the *hoppo* or head of the

foreign custom-house in Canton. We passed up and saw an angle of a fine wall facing us, with a new, well-built, round tower at the SW. angle. To the right was the river leading up to Nam-hoong and the Ty-muiling or "Large Plum," Pass into Kiangsi, and to the left the river up which our course lay, past Lokcheong and into the province of Hoonam. On the left bank of the Nam-hoong stream stands a fine new pagoda. Immediately in front of the city is a small island on which a literary pagoda stood till the rebels demolished it in 1854. On the right bank of the Lokcheong River nothing but ruins and smoky remains of houses was to be seen—the work of rebels. Numbers of sampans were plying across and up and down the river. Between the river-side and the city was a grassy slope without houses.

The situation of the city is striking and pretty, with fine hills at the background. We approached, after passing along 800 or 1000 yards of wall and getting aground, the usual two large flags suspended from the mandarin flagstaffs, and here our further progress was barred by a bridge of boats stretching across the river. We afterwards found that another similar bridge existed on the North River. These, we were told, were there to enable the custom-house to collect its duties. A number of junks were lying on either side. The bridge is only opened once a day, for a short time at 8 A.M., and we presume, according to Chinese custom, a squeeze is exacted for opening the gate and a *cumsha* for shutting it, and something for the gate-keepers to drink tea with, etc. Really, while it must benefit the city of Skeoo-chow to have such communication with the opposite shores (there about 200 yards apart), this delay and squeezing must be anything but beneficial to the trade of the province. It is simply to swell the revenues of the Fu, and might apparently for the reason assigned as well be done at all the county towns as at that of Hok-kong (Sheoo-chow-fu). As we intended going on in a few hours we applied to the custom-house to stretch a point and allow us to get through, which was immediately granted.

While we waited crowds of men and women came off to have a look at us. Many of the *sampans* are pulled here, as in Canton, by women. The women here wear a simple head-dress, but they manage to put it on in the most coquettish of the numerous different styles we see in China. It is made of blue cotton cloth, shaped like a Quakeress' bonnet, the upper part standing high to cover the hair arrangements; round the part in which is the back hair, is tied a black silk band, the ends with long fringes, which hang down dangling behind the ears. In the evening or morning, or when they wish to be seen, *i.e.* three times a day—morning, noon, and night—the front part is thrown back, the two corners fly out, the fringes dangle about, and the young ladies look quite pleased with themselves.

After we had had time allowed us to make such observations on the Sheoo-chow society, the pass came down, the gate was opened, and we passed through. We had previously sent up our cards to the county magistrate of Hok-kong. The wall extended for three hundred yards further, so that, if the city were a square, it would be a place of considerable size. We again dropped anchor a quarter of a mile above the city.

The people here showed much more excitement and wish to see foreigners than those in the country we had passed through ; crowds kept going and coming all day. A police boat was laid alongside of ours, and the police certainly kept the people in order in a very plain and fistilogical way. Still, a wave of the hand and a shout will not do when they know they are not breaking laws; it required a good shove or a pretty hard blow to keep them off, and the police did not spare them.

We landed in the afternoon with two policemen ahead of us; walked through the city, and along a part of the wall, and up a hill at the north, from which we saw that the city is much narrower than it is long. It seemed about 380 yards broad, and 1200 in length. The people were all anxious to see foreigners, but not obstreperous. We visited the Yamun, and were introduced in an informal way to one of the magistrates, who was civil enough. Among his retinue I noticed a face that had made an impression on me on some previous occasion, and I afterwards remembered that it was that of the head executioner at Canton, whom I had seen cutting off the greater number of one hundred and seventy-six heads at one time.

We walked out in the evening, passing two beautiful trees and three wooden cages suspended by the roadside, in which had been the heads of three pirates, beheaded a month previously. The heads had fallen out or been taken away, but the cages and names were there.

We started the following morning and reached the village of Pang-kong on the left bank, and here we saw boats loading with coal. So, as we were told the mines were two *lee*, or three-quarters of a mile, off, we determined to go and see them. The village was full of small carts drawn by oxen, with a basket on the frame which would hold about four hundredweights. On landing we were told the mine was ten *lee* off; however, we started, as the sun was not out. The country was a beautiful series of slopes and undulations, but not very fertile and with little or no cultivation ; a road or causeway made of stone led us to the village. We found a dépôt of coal at the village ; but, on asking for the pit, were told it was ten *lee* further on and over an adjoining hill. As we had come so far, we thought we might as well attain our object, so on we went. On inquiring from the head man of the *hong*, we could get no information as to the price of the coal ; he would only refer us to the principal at Fa-tee, in the city of Canton. The coal was both in lump and sifted, the latter being used at Canton and Fatshan by the blacksmiths, and at Haw-tong and other ironworks.

We held on straight for a most extraordinary collection of limestone hills in the distance. On attaining the top of the hill we saw the mines below us. A mat shed, as a house for the workmen, and a mat covering to the mouth of the mine, was all that was to be seen. In the hollow of the hill was a stream of a bright red colour, impregnated strongly with iron and with a very astringent chalybeate taste, probably a vein of iron ore. The side of the hill was perforated horizontally by three square openings, as shafts for air. A stream of water was running out of the pit mouth, which entered horizontally. The sides and roof, though of sandstone, were supported or lined by wooden piles. We entered one

of the pits, which was so narrow that it was difficult to avoid rubbing against the sides. The entrance was seven feet high; about twenty feet from the entrance, on a level with the ground, was a small light—the usual cup and wick. Here was a descent, it was said, of fifty feet. The little light did not seem, after waiting for some minutes, to reveal anything more than the upper steps of a ladder, or rather pieces of wood fixed horizontally into the perpendicular wall of the pit. Out of this, after we had talked a while, began to come up sundry black figures, to see what all these strange sounds in the upper world were; but, as there were no lights to be seen and no candles to be had, we did not feel inclined to go down into this Avernine darkness. The people here were very shy of saying anything about prices, and although, as usual in such cases among the Chinese, they were very communicative and civil at first, in no long time they lapsed into total silence and almost incivility. We asked (in order to find out what precautions they took) whether explosions ever took place, but they said they never did. One man had a piece of bamboo dangling by a string, which he said was for fire, but he ran away with it, and the others said it was the only one, but we could not see of what use it was, or how it could give light, unless it were charcoal. The coal, being the same as is sold in Canton and at Fa-tee, may be easily examined, but it has not a good reputation either as a fire, or as a steam, coal. The coal-fields here must be very extensive, and probably underlie the whole of the sandstone in this neighbourhood to a distance of twenty or twenty-five miles, and possibly extend to the north of the mountain range into Hoonam, as they extend from fifteen miles below Sheookwan, and coal is worked at Lokcheong, thirty miles above. Doubtless, if more scientific explorations were made, and deeper strata reached, with pumping facilities for keeping out the water, a seam of better quality might be reached. There is no want of workmen to go down into the darkest and deepest holes. Boys are brought up to it from fourteen or fifteen years, but no women are employed, as, formerly, in the more civilised and less barbarous England. They told us that upwards of one hundred men were working, and that they got one hundred cash a day and rice. There must be holes made at the lowest part of the hill to allow the water to run off, as no pump or anything of the sort worked by machinery, or even by hand labour, was seen, and yet there must be a large quantity of water continually finding its way into the pit. These pits seem to belong to the Sheoo-chow-fu, and are leased by him to companies to work. If an English company were to take the matter up, and make explorations in this district, there might be important results, and at least useful information obtained, if not success from a pecuniary point of view.

On returning we came by a different road and passed through two pretty villages, and, on coming to the main road, found a constant stream of people—groups of men and women obviously returning from market. Here a man driving a lame buffalo he could not get rid of, there a woman with a basket of chickens or ducklings which she had bought, all chattering and talking as such groups do on coming from a market at home. After a good walk we came down upon the village of Lyepotow-hue, and

found it a very busy scene. In a field outside was the cattle market in which was standing the unsold stock. At the back of the village the market was being held, where were six or eight rows of stalls or sheds. No tables of any sort existed except such as belonged to the different vendors, most of the articles being laid out on the ground. Native cloth in large quantities, earthenware, ironware, bamboo and wooden articles, fowls, pigs, ducks, etc., tea-stalls with good tea and cakes (a cup of tea 2 *cash*, equal to half a farthing). The market on our arrival came to a stand-still. We did not, however, wait long, but crossed over the river by a ferry boat, expecting to find our ark a short way off, but the men, having had a south wind, with an independence neither we nor the captain could check, gave us a further walk of five to six miles. We saw fishing cormorants at the village, a mode of fishing which seems to be practised all over China, except in the vicinity of Canton.

Here it is not out of place to glance at the possibility of a railway in the future from Canton to the north. The North River is one of the great highways of China. Its course is—or very nearly for so long a stream—directly south, with few or no deviations except from Samshui to Canton. This, from a physico-geographical point of view, shows that no large rivers fall into it. The great bend at Samshui makes the water carriage between the county town of Tsing-yuen and Canton five days, while it can easily be done on horseback in one, or in six hours, and might be done in one or two hours on rails.

The country between the city and this district, whenever the vicinity of the river is left, is not such as would cost much, and if the local government took it up could easily be obtained at its proper value. There is in reality only one river of any size to be crossed, and the country up to the Tsing-yuen gorge is undulating and, in most places, flat. Even through these gorges the line could easily be taken. There is no engineering difficulty of any kind between Canton and Lokcheong. It is only a question at present of raising funds and getting the acquiescence of the government, which no doubt they are quite ready to give. That the Chinese would avail themselves at once of it must appear certain to any one who knows aught of the thoroughly practical and highly progressive tendency of this people, whenever real benefits are placed before them.

In the neighbourhood of Sheookwan and at Lokcheong we passed several flocks of sheep, and, previously, we had passed a boat of sheep-merchants from the Shan-tung province. Small, well-shaped cattle, were frequently seen, but the buffalo were everywhere, and, either from the novelty of our appearance or a difference of temperament, the latter were perfectly civil and by no means unfriendly towards foreigners, as they invariably are at Canton and Shanghai. On reaching the village of Tongtau we anchored, and out of a small boat stepped on board a petty officer, who told us he was deputed to escort us with a little *snake*, or gun-boat, to Lokcheong. We expressed all the gratitude we felt to the Lokcheong authorities for their kindness, but stated that we felt no uneasiness on our own account, and in truth we knew that their company would be no succour to us in the hour of danger. He remained close

to us, but shortly after sent on board to know how much we would pay him. So it resolved itself into the usual ultimatum in China as elsewhere,—a matter of dollars.

Here our skipper engaged four extra hands for the next day's work, and, shortly after starting, we found we required them. There are five *taans*, or shallow rapids, between this place and Lokcheong. The great size of our craft made it a work of considerable difficulty to get past these; but when the captain tried to avoid a strong rapid and took a shallow one, and the huge thing rested all its bulk on the ripple-covered pebbles, then came out all the muscular energy of these Chinamen. Four on each side with long levers raised her an inch. Six on each side, with such groans and cries as seemed to come from their spinal marrows, with heads down and heels up, and shoulders against the curved wooden shoulder-piece attached to the bamboo, pushed and pushed till the great ark moved two inches. Then a number of stones were taken out from below her bottom or ahead of her, and again the same process was repeated, beginning with a cry and "*tsai, tsai, hi lo!*" altogether, and away she went another inch. At length she was got over the shallow and went on smoothly, making a little more water than before, and no wonder, with rocks and rolling and leverage to her bottom. But the brute force engaged, and willingly, steadily, and always good-naturedly given, was a striking contrast to the headwork and engineering skill engaged in pushing her sister ship, the *Great Eastern*, out of her difficulties. We made about six miles that day over these rapids, though they hardly deserve the name.

We anchored in a narrow part of the river, and sat on deck enjoying the moonlight. Starting in the afternoon, we walked across the flat, low country between the hills and the river, passed several hamlets and fine camphor-wood trees, the boys curious, but all kindly in their dispositions towards us, and anxious to know what we had to sell. But everywhere ruins marked the rebels' track.

The next morning our mandarin friend came and asked if we wished his further attendance, as, if not, he would return. We expressed the sorrow we should feel at his leaving us, but having no doubt that he would be more comfortable at his own fireside—*i.e.* opium lamp—than in a miserable little boat, we wished him a pleasant journey, and bade him adieu, after satisfying the rapacity of his followers. He was got rid of at a suitable time, and in leaving us he no doubt knew that he was making way for the next visitors, and probably was paid to go by our captain. About eight A.M. we stopped at a village, and were presently boarded by a number of strong-minded females, each armed with a section of bamboo sliced off to a point. We now became aware of what we did not know before, viz., that we were smuggling a number of *piculs* of salt in our hold, and that this was the market for the article. And yet it shows how these things are managed, that, though we were ignorant of the fact, the mandarins on the river were aware of it, and reported it to Sir Henry Parkes, as he afterwards assured me. Accordingly the bags were brought forth, the scoops were stuck into them by the ladies, and bargaining commenced. We did not feel our dignity

increased, as we had been several times asked to go ashore to lighten the boat, when in reality our weight was nothing compared to seventy piculs of salt.

The village seemed all salt shops. The men kept the shops and did the selling part of it, while men from the country about were there buying. This village is a sort of port to Lokcheong, where salt may be landed, and where there are probably facilities for conveying it into the country.

Our captain and crew (for it appears that each of them had as his share two piculs) having disposed of their salt, proposed to proceed. We reached Lokcheong, the terminus of our *lo-lung-shoone*, about 2 P.M., and, as we wound our way through the shipping and boating (the amount of which surprised us), the whole city was greatly moved. All the standing-room on the roofs of the boats was occupied, every window was thrown open and filled with heads, every opening in the streets which commanded a view of the river was a gallery of spectators. As on we threaded our way an occasional "*fan-kwei-lo*," or "foreign devils." was heard. After going through nearly three-quarters of a mile of this, we dropt our anchor opposite a rock, on which are built tiers of houses, and a temple on the top, at the back of which is a pagoda.

The houses, as we passed on, had a ruinous dilapidated appearance, both in the city and on the left bank opposite the Hoonam side. Ruins all along showed that the rebels are poor tenants for valuable tenements. We had not stopped ten minutes before all daylight was threatened to be obscured by ladies at the doors and heads at the windows. At last, in order to get a few minutes' respite, we were obliged to shut doors and windows. Then we were stifled, and to let air in they were opened again. We set Chinamen to keep them off, but no Chinaman dare, unless he be really clothed with official authority, and even then many are afraid of the popular voice. Several young men came up with most fierce and warlike appearance, and with tails of a most preposterous size. That of the first one, which must have been three inches in thickness, was finished off with, or made up of, red silk, so that it looked like a turban round his head. These were imperial troops from Chau-chow-fu, in the east of the province above Swatow. They had been for some time in Leen-chow-fu fighting with the rebels there, and were lately brought to clear them out of Ping-shek, where they had about three weeks before located themselves. They had driven them out of it, and were then on their way to Leen-chow again. They are a very coarse, savage set of men, and much feared by the people over whom they lord it with, as we saw, the insolence of insubordinate soldiery.

Lokcheong stands on the left bank of a bend of the river like the letter "S." There is good, deep, still water all along the face of the suburb, which is a mile in length. At the upper end of the suburb stands the city, enclosed by a wall which is in good condition. The habitable parts of the houses are all raised on brick pillars to a height of fifteen to twenty feet, showing what a rise takes place in the waters during the rainy season. We called at the *hong*, to which we had been recommended by Yow-loong, the Chang-shing-loong, and

were advised to take boats to Ping-shek, or on to Eecheong. We had another choice in chairs. Chairs took one day, the boats two. As our meals were a matter of some consideration to us, we thought the easier way was to go by the boat, so, after examination, we hired three boats at $16 each to Ping-shek only, as the charge to Eecheong seemed extortionate—$40 a boat. We had sent our cards to the Lokcheong magistrate, and he said he would be glad to see us. We accordingly went, and had a pleasant interview with him in a somewhat poor *yamun*. It turned out he had been in Hong-kong, and came up to Canton in one of the steamers, and had also been at Swatow. He told us that copies of the treaty had been pasted up all round this part of the country, and that a Portuguese padre had passed down a month ago dressed as a Chinese. We went round the city wall, the walk occupying about ten minutes. The interior was nearly all open ground with trees, which were at the time emitting a most delightful fragrance. Few houses were in the place, and these few seemed all under repair. Nothing had been left unscathed by the ruthless brand of rebellion.

On the whole we were very favourably impressed with the appearance of vitality in the place, considering that at that time of the year but little trade goes on, and that the rebels had so recently been in possession of the city and suburbs. We ascended a hill at the east end of the south suburb, from which we had an extensive view, and on the top of which we found the ruins of a five-storied pagoda which was destroyed by the rebels, and which must formerly have been a most prominent object in the landscape.

By the kindness of the *hong*, to which we were introduced, we very soon concluded a bargain with the owners of three *yu-shoone* to take us (four foreigners and four Chinese servants) to Ping-shek for $16 each boat. As said above, we had a choice between boats and chairs; the latter, however, were said to be not much used here, and not easily got, so we preferred boats; of these we had a choice of *yu-shoone* and *song-shoone*. The latter are ordinarily used by merchants to carry about thirty-six boxes of tea. The former are higher inside, and have boards at the side, which move out and in to give air and allow of seeing about. We preferred the latter, for, on leaving our huge comfortable ark, the accommodation looked very limited. However, at the end of our trip it seemed, on the whole, ample. After the bargain was concluded the boats moved alongside, and we transferred our goods and chattels without delay.

We started about 4 P.M., but, after going about a mile from the city, came to anchor, and finally made about three miles the first afternoon. Different excuses were given, but we thought the men preferred starting on their voyage early in the morning, and that our haste was useless. They begged for some money to present offerings to the gods who look after the safety of passengers on the river, and we started after prayers had been offered up, with a number of candles burning on the prows of the boats. We could not help feeling that this expenditure showed a certain amount of danger before us. The choice of the three boats individually by some of the party thinking to be very sharp was

amusing and unfortunate. The first choice was made, because on investigation there was only one child in it (an infant) to five in the second and four in the third. The servants, unfortunately, were put into the boat belonging to the head man (with the five) who, it appears, was thereby aggrieved and disappointed, and the one infant made more noise than the nine others together.

The countenances of the men and of the woman who acted as steersman showed much firmness, determination, and coolness. They all chewed betel-nut vigorously. The head man had been thirty-one years at the work. The second was thirty-nine years of age. The woman who steered our boat seemed about five-and-forty, and was as cool in the most difficult places as either of the others—perhaps more so.

The boats were peculiar, and we did not at first see the necessity for all the various modes of propulsion—two ropes, poles to push from the shoulders, and poles to pull backwards, bamboos with hooks to pull, levers to raise, and at the same time push on, sails and a scull; but in our upward course all these came into use. On the whole route from Lokcheong to Ping-shek the scenery was of ever-varying beauty—here soft green, rich and lovely, there grand with a splendid grouping of rock, dark brown pines and *Cunninghamia lanceolata*, with the bright green of the bursting foliage broken by brilliant yellows of flowering trees, and here and there a solitary purple or lilac-coloured tree in full blossom high up on the mountain-side. At one place the hill-side had been burnt, and the young verdure gave it the appearance of rich velvet. At another it had been cleared, and the young *Cunninghamias* were either planted regularly like a tea plantation, or left to grow in irregularity. But, the grander the scenery, the more certain are your thoughts to be diverted to the reality of your position. You find, while lost in admiration of the scenery, that your boat is in the middle of a roaring, rushing, boiling rapid, that eight, or perhaps twelve, men and women are struggling with the tow rope, holding on to every projecting crag or bush, that two men in the bows of the boat are groaning in their efforts to keep her off the rocks on either side, and her head up the stream, and you cannot help seeing that, if that half-inch rope of bamboo gives way, nothing can possibly save you, and your eyes fall on that undaunted woman at the stern who seldom moves a muscle of her face (except to turn the chewed betel-nut from one side to the other), her hand firmly grasping the long, heavy, steering oar, and you feel that she knows every rock and boulder, and to an inch how much water covers it. The rush becomes louder, and, looking over the side, you know that some rock is close under you by that gleaming, sliding, glassy flow carrying swiftly by sticks, bits of boats which have preceded you on the same route, charcoal, and branches, and consigning everything to the roaring, dashing abyss beside you. You look up and there is a boat coming down full swing—three men in her, the fore one in the bow holding an oar aloft perpendicularly, behind him another pushing his oar as fast as he can; the man in the stern, with the long flat scull which acts as rudder, ready for any turn with one of the bent bamboos in his right hand,—all, knowing that they must keep her head to the stream, never look to

right or left: the boat seems to fly. The clothes of the men are flying behind them—down, down they go, and before you can take a good look at them, they are in calm water at the bottom, and you have gained the calm water at the top. Fifty-seven of these boats passed us while going up one rapid.

A little accident occurred here which might have been very serious, but which, providentially, ended in nothing beyond showing us a phase of Chinese religion and life. After passing one of these rapids we were moving along the smooth dark water, when a sudden scream was heard ahead of us. We jumped up in time to see our man in the bow draw his arm out of the deep black water with the little boy of the leading boat and a young infant tied to his back. In all the boats the plank forming the gunwale was attached only at the bow end, and was loose towards the stern, allowing it to drop and hang down. It would appear that the little boy had been leaning against this, and it had given way, and he, losing his balance, fell forward. I think that, had this occurred to an English boy, the first thing his father would have done would have been to cuff his ears, to make him take more care in future, and tell him to dry his clothes. But what these pagans did was this. All three boats were run ashore just opposite the spot where it occurred, the father stepped ashore, made a little altar, and lighted several candles, arranging them in front of the altar; the little boy and the infant were then brought out and dressed entirely in new clothes, and the boy, reverentially putting his hands together, knocked his head on the ground nine times. Then the father burnt a quantity of paper, waving it about. The little infant was led to do the same, and then all jumped into the boat and took off their good clothes, and the three boats proceeded on their way. It was a solemn and striking service altogether, and gave us food for thought.

Six dead bodies were passed floating in the eddies. Some of these rapids, or *taans* as they are called, are fearful-looking things to combat with such apparently feeble means, but by dint of main force they are overcome. Whether they become more difficult to pass when the river is higher, or not, we cannot say. Along the whole course of the river it was evident that a rise of fifteen to twenty feet takes place during the rainy season, as the rocks are bare to a line about that height; the height at the time we passed seemed to be the average during the rest of the year, as the boats could hardly get over if it were much shallower, and the marks of the iron spikes in the rocks are much more numerous at that level than above it. Geological appearances are here to be studied on a grand scale, and are, at the same time, very clearly distinguishable. The limestone, sandstone, conglomerate clay, slate, and tilted strata of sandstone, primary rocks, granite, etc., are all very clearly traceable in mass. Of botanical riches there is truly an *embarras*, but it is not by travelling as we did that the recesses of the hill-side are to be rifled. By taking a boat by the day one might spend a month among these hills amidst the most beautiful scenery, gathering the riches which are strewed about with unsparing hand.

The rapids are all known to the boatmen by name, but the two best

known seem to be that of Kimoon, about the middle of the passage, and that of Hon-kaong at the upper end. Immediately above the latter is the temple of Hon-loong-tze, full of grotesque and hideous devils, to propitiate whom the professors of gratitude for favours past, or to come, were offering pork and burning silvered paper dollars, regardless of the expense. Above this temple the scenery becomes tamer and softer, though perhaps equally beautiful. The rock is sandstone and between the temple and Ping-shek are some fine specimens of rock scenery, especially the rocks called the Kei-hoong-shek, or Cock Hills, from the resemblance of a mass of rock on the top to a cock sitting. All this part of the river, which passes through sandstone, has a confined lake-like appearance. Ping-shek had often been mentioned to us, being always spoken of as one of the stations, and yet as only a few hours from Eecheong. The Lokcheong boats do not go further, so that the traveller is obliged either to take a smaller boat or a chair.

(*To be continued.*)

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## PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

Mr. H. M. Stanley visited Scotland in the early part of last month and addressed meetings of the Society in Edinburgh, Glasgow, Dundee, and Aberdeen. He was accompanied by Dr. Parke, Captain Nelson, Mr. Jephson, and Mr. Bonny —officers of his recent expedition. Sir William Mackinnon, Bart., the convener of the Society's Reception Committee, accompanied Mr. Stanley to Edinburgh and Glasgow, whilst Mr. A. L. Bruce, the vice-convener, continued with Mr. Stanley during the remainder of his tour in Scotland.

Mr. Stanley's party, on their arrival at Edinburgh, 9th June, were met at the railway station by the members of the Reception Committee. The same evening Mr. Stanley was entertained at a banquet in the Waterloo Rooms by the Council of the Society. Lord Tweeddale, Vice-President, in the unavoidable absence of the Duke of Argyll, President of the Society, occupied the chair. A number of distinguished guests accepted the invitation of the Council to meet Mr. Stanley. The croupiers were Sir William Mackinnon, Mr. A. L. Bruce, Mr. Ralph Richardson, Mr. J. G. Bartholomew, and Mr. Silva White.

The new rooms of the Society in the National Portrait Gallery were formally opened by Mr. Stanley on Tuesday, 10th June, at two P.M. Principal Sir William Muir occupied the chair. The brief speech which Mr. Stanley made on this occasion was as follows :—

"Ladies and Gentlemen,—It is nearly six years since I was in Edinburgh before to inaugurate certain rooms which were to be devoted to the use of the Scottish Geographical Society. Since then you have made a great deal of progress. You have added the word 'Royal' to your title. Very probably you will have in a few years the word 'Imperial.' Since then you have contributed considerably towards the opening up of the Dark Continent. Certainly I do not think there is any young Society in the world can point to a record of work such as this Society

has done ; for very probably if it had not been for the warm interest taken by this Society in Emin Pasha, it is likely that Emin Pasha would still have been at Wadelai, if not at Khartum. Two members of your Geographical Society, I may say, contributed £1000 to the funds of the Emin Relief Expedition. It was a small portion, it is true, of the sum of money ultimately devoted to the relief, but every little counted. It was £1000. There were about £32,000 spent. I hope that this year is only the beginning of another year of progress. I hope the next time I come to Edinburgh I shall find you possessed of a house of your own. There are a great many generous people in Scotland, and when they take hold of a thing they do it with all their might, in order to accomplish what they have begun. One of the guarantees of the success of these African projects is, that they are mainly in the hands of Scotsmen—the African Lakes Company and the British East Africa Company—and I feel sure that they will not let go their work until they are absolutely compelled by their own Government. By the permission given to me by your chairman and you, I hereby declare these rooms formally open for the Royal Scottish Geographical Society."

The official reception of Mr. Stanley by the Society was held the same evening in the United Presbyterian Synod Hall, Edinburgh. In the absence of the President, the chair was taken by the Marquess of Lorne. His Lordship having presented Mr. Stanley with the Society's Gold Medal, the distinguished explorer proceeded to deliver his Address, which we publish as our first article this month.

After the Address the Marquess of Lorne presented Diplomas of Fellowship to the officers of Mr. Stanley's expedition, and subsequently moved the vote of thanks to the lecturer. On the motion of Principal Sir William Muir, a vote of thanks was accorded to the Chairman.

The following day, 11th June, Mr. Stanley travelled to Glasgow. In the evening he was entertained at a banquet in St. Enoch Hotel, given by the Glasgow Branch of the Society. Sir J. N. Cuthbertson, in the absence of Mr. Renny Watson, presided. The croupiers were Mr. James Stevenson of Largs, Dr. W. G. Blackie, Dr. Thomas Muir, Mr. Robert Gourlay, and Dr. George A. Turner.

Mr. Stanley addressed the Glasgow Branch of the Society at a meeting in the City Hall on the following evening. The Duke of Montrose, Vice-President of the Society, was in the chair. The proceedings were opened by a Resolution of welcome, which was moved by Sir J. N. Cuthbertson and seconded by Dr. Muir. Mr. Stanley then delivered his address. The chairman, having moved a vote of thanks to the lecturer, was himself thanked for presiding, on the motion of Sheriff Berry.

On Friday, 13th June, Mr. Stanley left Glasgow for Dundee, and the same evening he addressed the Dundee Branch of the Society at a meeting convened in the Kinnaird Hall. Lord Kinnaird presided. Principal Peterson, Chairman of the Branch, moved, and Captain Clayhills Henderson seconded, the vote of thanks to Mr. Stanley. Lord Kinnaird was thanked for presiding, on the motion of Mr. J. M. Keiller.

Mr. Stanley addressed the Aberdeen Branch of the Society at a meeting convened in the Music Hall, on the evening of 16th June. The Earl of Aberdeen, Vice-President of the Society, was in the chair. On the motion of the Rev. Geo. A. Smith, seconded by Professor Pirie, a vote of thanks was awarded to Mr. Stanley ; and, on the motion of Lord Provost Stewart, Lord Aberdeen was thanked for presiding.

# GEOGRAPHICAL NOTES.

## EUROPE.

**British Association Meeting, 1890.**—The British Association for the Advancement of Science will assemble this year at Leeds, on 3d September, under the presidency of Sir Frederick Augustus Abel, C.B., D.C.L., D.Sc., F.R.S.

The President of the Geographical Section (E) is Lieut.-Colonel Sir R. Lambert Playfair. The Vice-Presidents are Mr. E. G. Ravenstein and Mr. Coutts Trotter. The Secretaries are Mr. J. Scott Keltie (Recorder), Mr. Barker, and Mr. A. Silva White.

**The Population of St. Petersburg.**—A census taken in this city on December 15/27, 1889, proved that during the previous twelve months the number of inhabitants had increased by 25,006, and had attained to a total of 1,003,315. *Globus*, Bd. lvii. No. 15, draws attention to three noteworthy points regarding the population. The first is that the increase is greater in the suburbs than in the heart of the city. In the second place, the ratio of women to men has increased during the last twenty years, probably in consequence of a greater demand for female labour. Lastly, the fact that since 1885 the births have been more numerous than the deaths, by 2750 yearly, indicates that the measures carried out by the municipal authorities have produced a favourable effect on the sanitary condition of the city.

**The Population of Iceland** has for several years been decreasing, owing to the strong tide of emigration to America. According to *Globus*, Bd. lvii. No. 15, the population in 1888 was 69,224, whereas in the preceding year it amounted to 69,641, and in 1885 to 71,613. This phenomenon is most marked in the northern and eastern parts of the island. The growth of the population of Reykjavik, the capital, from 3460 in 1885 to 3599 in 1888, shows that the tendency of population to concentration in towns prevails also in Iceland.

## AFRICA.

**Britain and Germany in Africa** (*With a Map*).—In a despatch, dated 14th June, from Lord Salisbury to the British Ambassador at Berlin (Sir E. Malet), the basis of an agreement between Britain and Germany as regards the future delimitation of their respective spheres of influence in Africa is given in outline. This agreement may be briefly defined as follows :—

The frontier between the British and German spheres of influence in the country intervening between Lake Victoria Nyanza, on the east, and the confines of the Congo Independent State, on the west, is to be drawn in about 1° S. lat., making a southerly detour in order to enclose Mount Mfumbiro within British territory. The Stevenson Road is declared British territory, and is roughly fixed as the coterminous boundary in the south between the British and German spheres of influence. Both Powers agree, respectively, to the free transit of goods on the part of their subjects (1) between Lake Nyassa and Tanganyika on the one hand, and (2) between the northern shores of Lake Tanganyika and British East Africa on the other hand. Germany relinquishes her acquired rights over Vitu, the sultanate thus passing into British possession, and she withdraws altogether from the north of British East Africa. Germany further recognises the islands of Manda and Patta as British possessions. Britain, with full consent, assumes an exclusive protectorate over the Sultanate of Zanzibar, including the islands of Zanzibar and Pemba. The fate of Mafia is not mentioned. It is proposed to give up to

Germany, in exchange for these concessions in Africa, the island of Heligoland, in the North Sea. It is further agreed that Britain shall use her influence with the Sultan of Zanzibar to acquire for Germany the exclusive control over the German coastal zone, which at present is included in the Sultanate.

In other regions of Africa, Great Britain and Germany have come to an agreement which is to form the basis of future negotiations. "The frontier between Ngami-land and Damaraland is not definitely drawn . . . . but it is agreed that in the latitude of Lake Ngami, and up to as far as the 18th degree of south latitude, the German frontier shall coincide with the 21st degree of east longitude from Greenwich." "In Togo-land . . . . it is arranged that a line shall be drawn which will secure the mouth of the Volta River to England, but will give to Germany access to that river at a higher point in its course."

The political sketch-map accompanying the present number of the *Magazine* shows roughly, but with sufficient accuracy, the re-adjustment of the British and German spheres of influence in East Africa.

**The Vitu Islands.**—Lamu is separated from the mainland by the Mlanga Kipungani, a channel nowhere less than 100 yards broad; and between Manda and the mainland runs the Mlanga Mkanda, which contains little water, and in some places is only 10 yards broad. The broad Lamu River lies between the two islands. To the north-east of Manda lies Patta, the largest of all the islands, separated from the mainland by the Siu Channel, and still further in the same direction the small island, Faza. Between Manda, Patta, and the mainland lies Manda Bay, in which a large number of vessels can find safe anchorage. Lamu is to a great extent covered with sandhills, lying on a substratum of sandstone, which crops out near Shela, at the south-east corner of the island. In the valleys between the sandhills vegetable soil mixed with sand has accumulated. In Manda, on the other hand, the substratum is of coral and is covered with red loam, but sandhills are present here also on the side towards the ocean. Numerous creeks run far into the land, and, with the adjoining mangrove swamps, occupy the larger part of the island. Patta has the same formation, but without a single sandbank, and with very few swamps. On Lamu coco plantations are laid out where the nature of the ground permits; pomegranates and vines are also successfully cultivated. All trades connected with shipping and boatbuilding are pursued, and fishing and other industries give occupation to the inhabitants. The town of Lamu, containing 5000 inhabitants, is the chief emporium for the neighbouring islands and the coast as far as the river Tana, for the steamers of the British India Steam Navigation Company have for some years called at its port in the Lamu River. The other more important settlements are Shela, at the mouth of the river, and Kipungani, on the channel of that name. On Manda, which has about the same area as Lamu, the sandhills are less extensive, covering only one-fifth of the surface instead of one-third, but mangrove swamps occupy three-fifths of the island, leaving only one-fifth for cultivation. The inhabitants are slaves, the property of masters living in Lamu, for whom they tend herds of goats and fell timber in the mangrove woods. They also fish and cut coral for building and lime-burning. Drinking-water is only to be obtained by digging near the sandhills by the sea. Patta is thrice as large as either of the other two islands and is of much more value, consisting, as it does for the most part, of soil capable of cultivation. Extensive ruins bear witness to the former importance of the town of Patta, now reduced to 300 tenantable houses containing 1000 inhabitants. Tobacco is grown, and the women and children gather orchella in the neighbouring country. The largest and most populous town at the present time is Siu. It lies on a creek of

the same name, which at high tide divides the island into two parts, and affords passage to boats both from the ocean and from the Siu channel. The 3000 inhabitants engage in fishing and hunting and are skilled in handicrafts, among which wood-carving has been brought to a high standard of excellence. Rasina (incorrectly named Faza on English maps), with a good harbour, and Siwy, at Siwy Point, on the east coast, are the other settlements worth mentioning. On Patta, as well as on Lamu, dwell a number of rich merchants and old families, whose more important estates are situated on the mainland.—*Globus*, Bd. lvii. No. 17.

**Cameroons.**—It was announced in the *Scot. Geog. Mag.*, vol. v. p. 502, that Dr. Zintgraff had successfully conducted an expedition from the Barombi station to Ibi on the Benué. Of this expedition Dr. Zintgraff has given a narrative in the *Mitteil. aus den Deutschen Schutzgebieten*, Bd. iii. Heft 1. He set out on 1st Jan. 1889, with a troop of 80 Veis and 100 Nangos from Lagos, and proceeded to the nearest village of the Banyang, where he hoped to obtain guides from the chief, Difang. As, however, this chief pretended that they could only be procured after a delay of two or three days, doubtless with the intention of summoning the Banyang together to oppose the advance of the expedition, Dr. Zintgraff determined to go on without guides, whereupon the natives assumed a hostile attitude, and a skirmish took place which left the Whites in possession of the village. Attacks were frequently made by the Banyang, especially during the five days the expedition remained in Gang. After passing through Ganjang Dr. Zintgraff travelled for two days through tangled forest till he came to a valley some 160 feet deep. Beyond this he caught sight, through an opening in the trees, of a long ridge of hills stretching to the south-east, and behind it another ridge about 2300 feet high, the sides of which had a brownish tint, being, as a Bayong follower from this country asserted, covered with grass. Here they entered the country of the Babé, and visited a village situated on a hill covered entirely with palms. The second day after leaving this village they, to their great delight, emerged from the toilsome forest on to the grassy uplands they had seen from a distance. Some days later the land of the Bali was entered, and a palaver, prolonged over ten days, was held with Garega, an influential chief, with the object of obtaining guides. The country is thickly peopled and well cultivated. Two days' journey eastwards is said to lie Bayong or Bamúm, watered by two large rivers, the Difum and Liba (Sannaga ?), and yielding immense supplies of ivory. Considering these advantages, the elevation of the place (4600 feet), and the friendly disposition of the chief, Dr. Zintgraff thought he could not spend his time better than in founding a station. This was accomplished in two months, the thirty buildings of which the station consisted being constructed principally by the natives. After three months Gárega gave permission for the party to proceed, and after some difficulties with the natives on the way, a new tribe, the Bufa, was reached. The Bali wear little clothing, the Bufa none at all, but they are good-natured savages. At Takum the proximity of white men was indicated by empty gin-bottles used as ornaments on the conical roofs of the huts. At Donga Dr. Zintgraff came upon Flegel's route, and passed on to Okari (Flegel's Wukari). Here he was considering how his followers were to be fed, seeing he had no goods left for barter, when two chests of provisions were brought to him, accompanied by a letter from the chief agent on the Benué, of the Royal Niger Company, Mr. M'Intosh. At Ibi, a day's journey from Okari, he was hospitably entertained for four days in the factory of the Company. Having ascended the river as far as Yola, he returned through Gashka and Ashaku to Takum. After marching for three days through the plantations of Takum the expedition left behind the round houses of Adamawa, built high up on

the hills for fear of hostile attacks, and after three days' journey through uninhabited country came again to rectangular huts with pyramidal roofs, in the country of Bafum. Bali lies to the south-south-west of this country, and thither the party directed their march until at last they met with some men sent out by Garega in search of them.

The whole journey occupied six months, and was in all respects satisfactory but for one unfortunate incident. While the expedition was crossing a chain of hills 600 or 700 feet high, east-north-east of the Bali station, a violent storm of wind, rain, and hail overtook it, the thermometer sinking 20° F. or more, whereby a number of men were benumbed and stupefied, of whom, by the next morning, no fewer than sixteen were dead. Such sudden changes of temperature are, according to the statements of the natives, by no means uncommon in this country.

**Togoland.** — The *Mittheilungen aus den Deutschen Schutzgebieten*, Bd. iii., Heft 1, contains a variety of information regarding the German possessions on the Guinea Coast. Lieutenant Kling made, in October last, excursions to the Fetish village of Dipongo and to Tziari, or Ajuti. From the new station Bismarckburg the routes to these villages branch off at Perëu, a village of 50 to 60 huts lying a short distance to the north-west of Bismarckburg, at an elevation of 2460 feet. Dipongo lies a few miles to the west-south-west of Perëu. It is reached by a very difficult path, leading at first along a ridge covered with grass 12 to 16 feet high, above which rise a few solitary trees, and then, ascending steeply to a height from which a magnificent view is obtained, plunges into dense forest where fallen trunks and close, thorny, underwood impede the progress of the traveller at every step. Dipongo is a village of nine huts belonging to the priest Yaopura, a man of great influence in the Adele district, to whom the natives resort for consultation. His chief residence is Diadassi, a village to the north-west of Dipongo, which is reached in six hours by a narrow, dangerous, path over rugged mountains. Provisions have to be brought by this path to Dipongo, for there is no farm at the latter place, but only banana groves. The elevation of Dipongo is about the same as that of the German station—that is, about 2300 feet—and the surrounding hills rise about 650 feet higher. Magnificent forests extend on all sides, where innumerable monkeys, blue turacos, toucans, pigeons, etc. find shelter. Tziari lies to the north of Perëu, and is reached by a path equally bad and of greater length. The village is built on a steep, stony slope beside the river Sabu, and consists of about 100 huts, standing so close together that there is often no room to pass between them. The doors are raised a foot or two from the ground, in order that the water may not enter when the river floods the village. Two days' journey in a north-easterly direction a large village named Tyaja is said to stand, and beyond that Fazugu, while a path turning off to the north-west leads to Kratji and Salaga, which in dry weather may be reached in two to five days. Near Tziari the two mountain chains, which run westwards and north-eastwards from Bismarckburg, unite and pass on towards the north-west, increasing in breadth and forming a succession of precipitous heights and ravines.

**The Basin of the Upper Niger.**—The *Revue Française*, 1st April 1890, publishes an extract from Lieut. M. E. Caron's report to the Colonial Congress, in which the explorer deals with the trade of the districts below the French territory, and the means whereby his countrymen may obtain a share in that trade. Timbuktu is but an emporium where native products are exchanged for European goods brought from Marocco and Tripoli. What the value of the trade of this town may be is very uncertain, but it enriches the Moors and satisfies the grasping Tuaregs. The French consul at Mogador puts down the value of a single caravan from Timbuktu at £24,000 to £28,000. The fortunes of the town are in the hands of

Muniru, chief of Masina, on whom it depends for its supplies. Jenné also, the next most important commercial centre, is in the territory of this chief, and, therefore, the trade of the Upper Niger is entirely under his control. Lieut. Caron wishes to see the ostrich feathers, gold, skins, and ivory, which constitute the most valuable exports of Timbuktu and now pass into English hands at Mogador or elsewhere, brought to Bakel and Médine ; and he considers that the most promising means of attaining this desirable object would be to make a treaty with Muniru, by which that ruler should undertake to divert native products towards the French territory and to purchase European goods only from the French. Since M. Caron's report was written Muniru has accepted the protection of France. The goods being obtained, the next thing is to provide rapid and cheap means of transit between Bammako on the Niger and the Lower Senegal. In the *Scot. Geog. Mag.*, vol. vi. p. 211, mention was made of the railway constructed between Kayes and Bafulabé. The latter town is distant 194 miles from Bammako. As far as Badumbé the Bakhoy is navigable without much difficulty and, if certain engineering plans were carried out, boats might perhaps ascend 19 miles further, to the falls of Billy. Over the remainder of the distance (rather more than half) communication must be established by the construction of a good road or a Decauville railway.

**The Meteorology of the Guinea Coast.**—A long article by Dr. von Danckelman, containing details concerning the atmospheric phenomena of this region, has been published in the *Mitteil. aus den Deutschen Schutzgebieten*, Bd. iii. Heft 1. These depend in the main on the atmospheric pressure over the lands of North Africa, and especially the Sahara, where the mean temperature in summer rises above 98° F. The low pressure thus produced draws in the air from all sides to restore equilibrium. Hence, the prevalent winds on the Guinea Coast during this season are the south and south-west, while in winter the contrary phenomenon occurs, except sometimes on the shore, where the higher temperature of the land maintains a continuance of southerly breezes. The highest pressure occurs in July and August, and the lowest in February and March. The range of the monthly mean is small, amounting only to ·14 to ·18 inch. As regards temperature we find that the maximum occurs in February or April and the minimum in July or August. The mean daily range is nearly twice as great in the hottest season as in the coldest, and increases considerably towards the interior. In Bismarckburg the mean maximum (in March) was 87·7° F. and the minimum (in July and August) 65·3°, and the maximum and minimum ranges 23·6° and 13·8° respectively. At Akassa the average daily range is only 10°, while at Bismarckburg it is 18·5°. Turning now to the rainfall, it appears that a rainy season of four months sets in shortly before the sun reaches the zenith, which it does in the beginning of April, and that the maximum fall occurs in May and June. About the latter part of June the dry season commences and lasts till the middle, and sometimes the end, of September. The yearly rainfall at Bismarckburg is over 59 in. ; at Accra, 29 in. ; at Christiansborg 22·6 in. Half the storms come from directions lying between north-east and south-east, most of them from the north-east. Tornadoes are most frequent before the commencement of the rainy season. The most singular phenomenon on this coast is the *Harmattan*, a dry wind laden with dust and often bringing with it hazy and cloudy weather. On the Senegal it follows an east to east-south-easterly direction ; on the Gold Coast and near the mouth of the Niger a more northerly course, and blows most frequently in December and February.

## AMERICA.

**A Borax Lake.**—In California, between the Sierra Nevada and the Rocky Mountains, lies a large, scantily watered, hollow, in which stand numerous morasses

rich in various salts. The bottom is covered with volcanic *débris*, which is disintegrated superficially by the rains, the particles being carried off by streamlets and deposited finally in these morasses, or salt lakes as they are called. One of these lakes lies 450 miles to the south-east of San Francisco, 1700 feet above the sea-level, and has an area of about 100 square miles. In the centre lies a permanent pool of water, surrounded by a hard crust, which is covered by an efflorescence consisting of sodium sulphate, common salt, sodium carbonate, and borax. When this layer has attained the thickness of an inch, it is dug up and the borax is extracted from it. After three or four years the layer has again attained its former depth.—*Deutsche Rundschau*, Jahrg. xii. Heft. 9.

The **Frontier between Brazil and the Argentine Republic** has been the subject of dispute between the two countries ever since they were dependent on Portugal and Spain respectively. The *Revue Française de l'Etranger et des Colonies*, 15th April 1890, states that, on January 25th, a treaty was signed at Monte Video which has finally settled the question. The disputed territory is the province of Misiones, which has an area of rather more than 6100 square miles. By the new treaty about three-fourths are assigned to the Argentine Republic, but it is provided that the inhabitants of the district ceded by Brazil shall retain their rights as Brazilian citizens, and be treated as such by the new authorities.

**The Amazon.**—Two travellers have recently visited this river and its tributaries. M. Marcel Monnier, in 1886-7, crossed the Andes from the Pacific, and, descending the Huallaga and the Amazon, arrived at Para, while in 1888-9 Dr. P. Ehrenreich, well known for his exploration of the Xingu River, ascended from the Atlantic to the Purus. M. Monnier landed at Truxillo, and, after an arduous passage of the Cordilleras, struck across the Upper Huallaga, having spent three months in reaching a spot only about 420 miles from the coast. This river he descended on a raft, the only form of craft able to live amidst the rapids. Of these there are forty-two, nineteen being particularly formidable. The most dangerous of all succeed one another at short intervals between 8° 14′ and 7° 50′ S. lat. From Pongo d'Aguire, where the Huallaga cuts through one of the last ridges of the eastern Cordillera, there exist no more serious obstacles to navigation than barriers of fallen trees, and these are not met with below the island of Yurimaguas, some 40 miles further down. At this point the river measures 1300 yards across, and has a mean depth of 15 fathoms. The distance from the Amazon is 90, and from the Atlantic 2795, miles. Along the 340 miles of its course traversed by M. Monnier no fewer than fifty-two affluents enter the Huallaga, several of which, such as the Valle, Huayabamba, and Mayo, are navigable by large canoes to a distance of 40 to 50 miles from their mouths. In spite of its long succession of rapids this magnificent stream will one day become an important commercial artery. Its valley is of remarkable fertility, and one of the most salubrious regions of the intertropical lands. High banks protect the adjacent land from inundation, and, along these, roads might be constructed to connect the navigable reaches of the river. Here is the western boundary of the Pampas del Sacramento, mentioned by M. Guillaume (*Scot. Geog. Mag.* vol. vi. p. 242), an immense plain watered by the Huallaga, Amazon, and Ucayali, and intersected, particularly in its northern part, by natural canals forming ways of communication between the different rivers. A little further upstream than the Huallaga the Pastasa enters the Amazon on its left bank. Its mouth is encumbered by sand-banks, which nowhere leave a depth of more than three fathoms. M. Monnier ascended this river to a distance of 125 miles from its mouth, and found that, in spite of the large volume of its waters and the strength of its current, innumerable islets and sand-banks render

navigation difficult, and, for boats drawing more than three feet of water, impossible. This is to be regretted, since here, as in all the river-valleys of that country, caoutchouc is abundant.

Dr. Ehrenreich left Para, on 28th Nov. 1888, on board the steamer *Esperanza*. The first day's journey, past the mouth of the Tocantins, across the bay of Marajo into the bay which lies to the south of the island and communicates with the main stream of the Amazon by numerous canals, was somewhat monotonous. Dr. Ehrenreich believes that the island of Marajo and the multitudinous channels between the Tocantins and the Amazon owe their origin to the sinking of the eastern coast of the continent. The passage through the channel from Tajapuru to Gurupa, where the steamer enters the Amazon proper, is full of interest. The soil rises but a few inches above the water, so that the india-rubber collectors are obliged to raise their dwellings on piles. These huts are almost hidden by creepers, and every foot of ground is overgrown with rank vegetation, the most prominent forms being palms of all kinds. The cool sea-breezes blow inland as far as Gurupa, and, besides modifying the temperature, sweep away troublesome insects, which further up the river torture the traveller so sorely. As far as the confluence of the Xingu the islands are so numerous that no view can be obtained of the full breadth of the stream, but above this point the huge river has the appearance of a sea, in the early morning when mist conceals the opposite shore. Along the northern bank a low range of hills, known as the Serra de Almeirim, extends beyond the mouth of the Tapajos. These hills are the remains of the plateau which formerly connected the highlands of Guiana with the table-land of the interior of Brazil. The right bank is almost everywhere low. Near Obidos the river is much contracted, but still retains a breadth of about 2000 yards. The velocity of the current is, of course, considerably increased, and it is calculated that (the depth being about 240 feet) nearly half-a-million cubic feet of water flow past per hour. On December 6th Dr. Ehrenreich arrived at the mouth of the Negro, the inky-black water of which river contrasts strongly with the yellowish green Amazon. In several of the tributaries of the Amazon this colour is observable. Its cause is not yet definitely determined, but it seems probable that the presence in the water of a large quantity of organic matter produces this tint, and at the same time renders the water unwholesome, though it must be credited with the agreeable property of keeping troublesome insects at a distance. A few miles above its mouth stands Manaos, the chief town of Amazonas, the largest of the Brazilian provinces. This town, which was only a small village some sixty or seventy years ago, owes its rapid development during the last ten years to its advantageous situation at the apex of the fan-shaped network of waterways formed by the Amazon and its tributaries. Many European firms have depôts there, and British steamers keep up constant intercourse with the Old World. The climate of this town, situated near the Equator and at an elevation of only 110 feet above the sea-level, is uniformly damp and hot (annual mean 79° F.), but from August to October a fairly dry season intervenes. On December 17th Dr. Ehrenreich took his passage on a steamer starting for the Purus. This river lies in the great depression which, formerly covered with sea-water, was cut off from the Pacific by the elevation of the Andes, and gradually filled with detritus carried down from the mountains. In this district stones are rarely seen, and the same character is shared by all the river valleys to the west of the Madeira and Rio Negro. The courses of these rivers are very winding. They afford free navigation for considerable distances, and overflow their banks during a large part of the year, thereby producing exuberant vegetation. The difference of level at which the water stands in the wet and dry seasons, amounting in the Purus to as much as 50 to 65 feet, and the yielding nature of the alluvial soil, give rise to frequent

changes in the bed of the river and to innumerable side-channels and lagoons, which divide the country by a network of waterways and act as reservoirs in times of flood. The main channel of the Purus has, at its mouth, about the same breadth as the Rhine at Cologne (433 yards). The yellow waters meander through endless forest, where no hill of any size breaks the monotony. Only in the clearings, round the huts of the caoutchouc collectors, is the eye relieved by graceful palms, oranges, etc. On the 25th Dr. Ehrenreich arrived at Labrea, the chief town of the district, named after Colonel Labre. Not far above Labrea the Ituxy, which is navigable for about 370 miles, enters the Purus, and beyond it the Sepatynim. Dr. Ehrenreich took up his quarters at Hyutanaham, the highest point to which the steamers ply which receive a subvention from the Government. To the Upper Purus and the Acre boats run in the rainy season only and when a cargo can be obtained. The principal occupation in this country is the collection of caoutchouc, of which there is an unlimited supply. The fall, however, of the price of this article, and the high price of provisions and other European goods in the settlements on the Purus, threaten ruin to the owners of factories engaged in this enterprise. The native tribes are in the same stage of civilisation as the Xingu Indians and those described by M. Guillaume. The most important tribe on the Purus are the Ipurinas or Cangiti, which extend in countless hordes and under very different names up to the sources of the Purus and the Acre.—*Verhandl. der Gesell. für Erdkunde zu Berlin*, Bd. xvii. No. 3 ; and *Bulletin de la Soc. de Géographie*, 4me Trim. 1889.

## AUSTRALASIA, ETC.

**The Western Islands of Torres Straits.**—The *Journal of the Anthropological Institute*, February 1890, contains an article, chiefly ethnographical, on the Western Tribe of the Torres Straits. Two distinct tribes inhabit the islands of these straits divided by the meridian of 143° 30′ E. long. The larger islands are Saibai, Boigou or Talbot Island, Mabuiag or Jervis Island, Badu or Mulgrave Island, Moa, Muralug or Prince of Wales' Island. The first is about 75 miles to the north of Cape York, and is separated from Daudai in New Guinea only by a channel, two miles broad at its narrowest part, which is hardly navigable on account of its shoals. The island is twelve miles long, with an average breadth of three miles, and consists mainly of a swamp surrounded by a narrow sandy beach. A small hilly island, named Dauan, lies about two miles and a half from Saibai, and about twelve miles north-west of the latter is situated Boigou, at the mouth of the Mai Kassa River. This island also is low and swampy : it is about five and a half miles long by two broad. Mabuiag lies in the narrowest part of the straits at about equal distances from the shores. It has the form of a triangle, each side of which measures two miles, is very hilly and moderately fertile. Five miles south of Mabuiag lies Badu, about six miles in diameter, hilly in the centre, and containing a good deal of well-wooded, low-lying land. Moa, about twenty miles north of Thursday Island, is comparatively large, and on the east is hilly, the highest eminence rising to 1310 feet. The low land on the western side is known by the name of It. Muralug, the largest of all these islands, is of an irregular quadrangular form, its longer diagonal, from Heath Point to Cape Cornwall, measuring nearly eleven nautical miles. Except in the north-east corner, where there is a mangrove swamp two miles long by a mile and a half broad, the island is hilly and covered with trees, though the hills are low, the highest elevation being only 761 feet. Muralug lies fifteen miles due west of Cape York. Mr. Haddon's object in visiting these islands was to collect information concerning the primitive customs of the

inhabitants before all memory of them was lost. These natives, of Papuan race, seem to have lived in a very primitive state. Of religion, properly speaking, they had no idea, but observed many superstitious forms, some of which still survive. They believed in the existence of spirits, and that the souls of the dead went to an island to leeward—that is, to westward. There was no law, but each man had to obtain satisfaction for a wrong done by his own arm, or by witchcraft. Turtle and dugong are the principal articles of food, and edible roots, such as yams, sweet potatoes, and those of a kind of rush and of a convolvulus. Domestic animals and cereals were formerly unknown. Bananas are cultivated, and on some of the islands coco palms grow. A kind of bean, the seeds of the pandanus, and a few other fruits are eaten, and an inferior kind of sago is occasionally made from the pith of a cycad.

**New Guinea—Kiwai Island, Fly River.**—Two recent despatches, Nos. 113 and 122, from Sir William Macgregor to the Government of Queensland, give some interesting details about the country on either side of the estuary of the Fly River, from its mouth to a point some 200 miles up. Although the streams connected with the Aird River system further east, lately visited by Mr. Theodore Bevan, give much readier access to a more elevated and more attractive region, it would still appear that the Fly River offers a more important roadway into the interior; and although, with a doubtful exception to be mentioned presently, the country about the lower course of the Fly River is not directly available for the operations of the planter, yet the exceptionally prosperous condition of the numerous natives on Kiwai Island holds out, according to Sir W. Macgregor, a hopeful prospect of a considerable trade, while the position of the island at the mouth of the estuary gives it a natural importance. Kiwai is a great detached segment of the delta, with a navigable channel on each side; it is some 36 miles in length by $2\frac{1}{2}$ in width, and thus has an area of about 90 square miles. It is nowhere more than 6 feet above high-water level, while a good deal of its area is below the level of spring tides, and all along its SE. coasts the sea is encroaching, and the land apparently sinking. With the exception of Daumori Island, 12 or 15 miles further up, which is very much smaller, Kiwai is the only one of the numerous islands in the estuary sufficiently above water to be permanently inhabited.

There are several villages along the coasts of Kiwai, their position being marked by groves of coco palms. These, and the sago palm, are the principal sources of food supply—sago always being in use, whatever other vegetables may be forthcoming in addition—and next to these the banana. All these are assiduously cultivated, as are the sugar-cane, taro, melons, and various other vegetables. Mangoes, too, were observed, but no member of the orange family. The writer seems to have been especially struck by the skilful cultivation and the numerous, and well-distinguished, varieties which the people brought him of different vegetables, many of them worthy the attention of our own planters in Queensland. This was especially the case with regard to bananas, of which no less than thirty-six varieties were observed, along with twenty kinds of yams and ten of sweet potatoes, while there are eleven different kinds of fibre. And their dwellings seemed to him sometimes equally worthy of commendation. The village of Odagositia consists chiefly of one enormous house and two or three small ones, and the description of the large house gives a clear idea of those structures: "Including the public unappropriated verandah portion, on which the chief, etc., sit, its length is about 520 feet; in width it is more than thirty feet inside. It rests on five rows of posts, the central row consisting of sticks about two feet in diameter. More than one-third of the width is devoted to a clear passage along the middle of the house from end to end; the sides are divided into quarters for different families in the usual way,

by a few upright posts only. The floor consists of the palm-tree called 'te' at Kiwai, split open and laid down with the smooth black polished outer surface upwards. The roof is, for the width of the house, rather low—probably little over twenty feet; it has a curve that makes it look both roomy and graceful. The thatch is of palm leaves sewed together, and is in perfect order. In each family quarter there is a fire-place and a sort of frame or crate, on which the goods and chattels are stored. Not a speck of dust or dirt was to be seen in this huge abode; not a shell or billet of firewood seemed to be out of place in any compartment, but all was a perfect model of cleanliness, order, and regularity. The entrance was ornamented by two carved and painted boards about twelve or fifteen inches broad, and ten or twelve feet high, put up as door-posts, bearing figures of the human foot, hand, and arm, etc. Rows of ornaments, consisting of palm leaves variously wrought, were suspended from the roof-tree from end to end."

These coasts had been visited by Mr. Bevan, who describes the people of one of the villages as cannibals and accompanying their feasts with draughts of kava. But Sir William found no trace of the kava plant (*Piper methysticum*) in the neighbourhood, nor any evidences of cannibalism. The views of the natives on the subject were elicited in a very amusing way. Mr. Bevan's account was translated and read out to them, when "some roared with laughter; others looked at it much more seriously, and said it was *karokaro auera* ('bitter language'), and *warama* ('not true')."

But Sir W. Macgregor hints that although Mr. Bevan had heard much more than the truth, it was just possible that he had himself heard somewhat less—though he disbelieves in the cannibalism. Proceeding higher up the river, the country on the left bank lies apparently lower even than the island of Kiwai, being, with the exception of a few mounds of red clay, the remnants probably of an older formation, barely a foot above high-water level, and much of it below this. Here there are great forest trees, half-buried in creepers; these, interlacing with the scrub beneath, make an impenetrable barrier. The trees are not of food-producing species; even the bread-fruit trees, which are numerous, being without fruit—though this is not the case on the islands. It is just conceivable, he says, that natives of countries accustomed to rice cultivation might make something of this country, but the expense of clearing would be very great, and there would, besides, be the chances of opposition from a numerous and warlike people who have already occupied all the localities now available for cultivation.

At one point on this left bank the party suddenly found themselves in a position of great danger. Their launch had grounded, or rather been left dry by a receding tide, and, accordingly, in the morning they were aware of a number of armed canoes, which, coming from various points, formed up in a semicircle at about half a mile distance, and began manœuvring in preparation for an attack. The skill and beauty of their evolutions, as he describes them, must have been a striking sight, and under safer circumstances would, he says, have been more agreeably interesting. Fortunately their advance was checked, and the force eventually dispersed by the skilful firing of several long shots at from 800 to 1200 yards, without —so far as could be seen—any loss of life; and when the party afterwards visited the village, the natives, when once persuaded that the visit was not one of retaliation, were very friendly; and Sir William accounts for the hostile character of their first reception of his party by the fact that this village had been thoughtlessly plundered some years before of "curiosities," *i.e.* valuable heirlooms, and of its pigs, by the *Ellangowan*, under D'Albertis; and more recently by the Australian expedition in the *Bonito*.

For natural history researches the district seems to offer but a poor field,

the birds and plants being few, and relatively uninteresting. Vocabularies, however, to the extent of 1200 words, were brought away, though they may be expected, Sir William says, to contain many inaccuracies and even absurdities ; and his notes on the diseases of the district are not without interest.

**The Kei Islands.**—Baron G. van Hoevell visited these islands in October and November 1887, and on his return made known many additional facts concerning them. (*Deutsche Geog. Blätter*, Bd. xiii. Heft. 1 and 2.) The group lies to the west of the Aru Islands, between 5° 12′ and 6° 6′ S. lat., and 132° and 133° 10′ E. long. It consists of Great Kei, or Nuhu Yut, two islands to the west of this, called Little Kei, and the small islets of the Taiandu group stretching still further westwards. While the islands of Little Kei are low and of volcanic origin, Great Kei belongs to an older formation, for sandstone and granite are the rocks most frequently met with. In the interior rise a few isolated mountains, the highest of which are about 2500 feet. On the north, east, and south coasts steep rocks skirt the shore, and only a part of the west coast is low and sandy. Numerous streams, often forming cascades, pour their waters after a short course over the rocks into the sea, but most of them dry up during the east monsoon, which sets in in May and is a dry wind ; whereas the west monsoon, which begins to blow in December, brings abundance of rain. But few good anchorages are to be found on the coast of Great Kei. A few mountain paths in very bad condition cross the island from east to west. The vegetation of the group corresponds to the poverty of the soil. Rice, potatoes, coco palms, red pepper, betel nuts, sugar-cane, and sago palms are the most common forms ; little attention is given to cultivation. Ironwood grows on Little Kei, and the root bast of *Marinda citrifolia* yields a yellow dyestuff, of which about 84 tons are exported annually. The fauna of the islands is also small : except a few imported domestic animals, pigs, goats, dogs, mice, bats, and a variety of kangaroo are the only representatives of the vertebrates. Crocodiles are numerous on the swampy south coast of the island Nuhututut, and snakes are everywhere—large pythons are found in Great Kei—and there is a great variety of birds and insects. The total population of the whole group in 1887 was 20,030, of whom 5893 were Mohammedans, and 14,137 Pagans. Some account of native customs and beliefs is given in the *Scot. Geog. Magazine*, vol. iv. 497. Fishing is the chief occupation : *bêche-de-mer* is taken in abundance, and turtles occasionally. Pearl oysters are plentiful at a little distance from the shore, but the natives are no divers. The principal imports are rice, linen, hardware, tobacco, and arrack ; the exports, timber, coconut oil, *prauws*, earthenware, and *bêche-de-mer*. Herr K. Martin, in the *Tijdschrift van het K. Nederlandsche Aardr. Genootschap*, Deel vii. No. 1, discusses the geological features of these islands and their geographical relation to the neighbouring lands. The longer axis of the Kei islands, as well as that of the Aru Islands and Timur Laut, stretches from north-east to south-west, and Timur also deviates considerably from the line of direction of the Sunda islands. Again, the Banda Sea is a clearly-marked depression between the shallow waters of New Guinea and the Australian continent on the one hand, and of Borneo, Java, etc., on the other. These considerations have led Herr Martin to the conclusion, confirmed by the diversity of structure of the lands on either side of the Banda Sea, that the Kei and other neighbouring islands are, geographically, an appendage to the Australian continent.

**Banks Islands.**—This little group lies to the north of the New Hebrides, and consists of Gaua, or Sta. Maria, Vanua Lava, Ureparapara, Valua, Mota, and several smaller islands. The largest is Vanua Lava, which is about 15 nautical miles from north to south, and 10 broad. A chain of mountains traverses the island

longitudinally, containing at its culminating point (nearly 3000 feet high) a crater from which smoke frequently ascends. On the east coast is situated Port Patteson, one of the two harbours of the group, the other being on the island of Ureparapara, which is evidently a half-submerged crater. Sta. Maria has the form of a circle, 10 nautical miles in diameter. It rises in a broad summit to the height of 2000 feet, and, like Vanua Lava, is well clothed with forest. The other islands have comparatively insignificant areas. The climate of the elevated lands is not more unhealthy than that of other tropical countries. The rainy season lasts from November to April. Hurricanes are of rare occurrence, but earthquakes often take place. The soft heavy soil, composed of volcanic *débris* and vegetable refuse, is exceedingly productive. The gourds, melons, yams, taro, and breadfruit of the Banks Islands are of excellent quality. Bananas, pine-apples, mangoes, limes, and lemons grow in profusion, and nutmegs and pepper yield good crops. Coco-nut plantations are numerous, and the more elevated slopes have been proved to be suitable for the cultivation of coffee. Tea also and rice would probably thrive. Large numbers of goats, ducks, geese and turkeys are kept, but no sheep. Snakes of a harmless kind and ducks are the chief representatives of the very limited fauna. Of trees there are wild nutmegs, oaks, a large kind of bamboo, and an abundance of trees resembling the beech, and with an excellent hard, close wood. Although the New Hebrides lie so near, the natives of Banks Islands are thoroughly different in appearance, manners, customs and dress from the inhabitants of the former group. Their number, now about 5000, diminishes year by year. Their language contains several dialects, of which that of the island of Mota is the most widely spread and generally understood. The natives have a calm and gentle disposition, and are friendly towards white men.—*Globus*, Bd. lvii. No. 15.

## GENERAL.

**The Way to the North Pole.**—*Petermann's Mitteilungen*, Bd. xxxvi. No. 4, describes Dr. F. Nansen's plan for a Polar expedition, as propounded by him before the Geographical Society of Christiania. There are three routes by which expeditions have penetrated into high latitudes, namely, along the west coast of Greenland, by which Greely advanced to 83° 24′ N. lat.; to the east of Greenland and northwards from Spitzbergen, where, in 1827, Parry reached 82° 45′ N. lat.; and to the north of Novaia Zemlia, by which route the Payer-Weyprecht expedition, after discovering Franz Josef Land, pushed on to 82° 5′ N. lat. All these routes Dr. Nansen rejected, giving as his reasons the unfavourable conditions of the ice reported by these explorers, and the existence of currents flowing southwards. The route he advocates is that taken in 1879 by the *Jeannette*, a vessel despatched by Mr. Gordon Bennet, the proprietor of the *New York Herald*, to search for Nordenskiöld. It is true that the *Jeannette*, soon after passing through Bering Straits, was enclosed by the ice and sank, two years later, not far from the New Siberian Islands. Nevertheless, Dr. Nansen believes that this is the most favourable route, inasmuch as on that side of the Pole a current flows north-westwards. He would therefore make for the strait or passage supposed by Captain Hovgaard (*S. G. M.* vol. vi. p. 25) to exist to the north of Cape Chelyuskin, but he would enter the Polar Seas by Bering Straits instead of through the Kara Sea. Dr. Nansen argues that a northerly current from the New Siberian Islands is probably produced by the vast quantity of water flowing northwards from the estuaries of Asia and Europe, and that the southerly currents on other sides of the Pole postulate the existence of a compensating current. It may be seen, by referring to Captain Hovgaard's article, that he and Dr. Nansen agree in their theories concerning the Polar currents, but

that the former does not consider the route by the New Siberian Islands practicable owing to the conditions of the ice. It has been already mentioned (*vid. S. G. M.* vol. vi. p. 270) that Dr. Nansen intends to have a vessel of peculiar construction built, but, should it be necessary to leave the ship, he believes it will be possible to place the boats, provisions, and clothing on the pack, and float on it until open water is again reached. Judging from the length of time in which the ice-block, alluded to by Captain Hovgaard in his lecture, travelled to the west coast of Greenland, Dr. Nansen allows two years for the passage. Allowing, however, for unfavourable ice conditions, and remembering that, when once the ship is enclosed in the pack and has commenced to float with it, the crew will no longer be able to retreat, but must pursue their course though it may lead to death, it seems advisable to fix the quantity of stores required at enough to feed and clothe the expedition for four to five years. This route is still untried, and under favourable circumstances the expedition may be successful, but the alternative fate of success or death must deter all but the boldest, or most reckless, men from offering themselves as members.

**Libration of the Earth.**—Dr. Supan has written a note in *Petermann's Mitteilungen*, Bd. xxxvi. No. 5, on the displacement of the earth's axis. That the latitude of a place is not constant has long been suspected, but it was only at the end of last year that systematic observations, carried out at some of the observatories of Central Europe, clearly established the fact by eliminating all chances of error in instruments and observers. Professor Helmert reported in No. 2963 of the *Astronomische Nachrichten* that the latitudes of Berlin and Potsdam, which had shown no perceptible variation during the first six months of 1889, in the third quarter of that year increased at first and then diminished, the movement continuing till January 1890. In Berlin and Potsdam this decrease amounted to from 5″ to 6″, and this variation was confirmed by observations at Prague and Strasbourg, the results at the first three observatories agreeing to within one-tenth of a second. The subject is to be discussed at the meeting of the Commission for International Geodesy to be held in Freiburg next September, when, it is to be hoped, arrangements will be made for a strict examination of this phenomenon.

**Bottles carried by Ocean Currents.**—The *Annalen der Hydrographie*, Heft iv. 1890, gives data concerning three bottles thrown overboard in the Atlantic. One was cast adrift on August 4th, 1888, in 14° N. lat. and 26° W. long., and was found on the November 5th in the following year on the east coast of Florida a few miles north of Indian River Inlet, in 27° 32′ N. lat. and 80° 19′ W. long. This spot lies 3150 nautical miles from the place where the bottle was thrown overboard, but as it probably floated to the south of the West Indian Islands and round Cape Antonio, it must have travelled about 3990 nautical miles in the 458 days. Another bottle thrown overboard on 25th November 1888, in 1° 40′ N. lat. and 29° 57′ W. long., was picked up on the shore of Matacambae Island off the coast of Florida, having performed a journey of some 3790 nautical miles in 350 days. The third was started on its journey in lat. 30° 53′ S. and long. 49° 43′ W., and was found on the coast of Brazil near the mouth of the river Tramandahy, in 29° 56′ S. lat. and 50° 8′ W. long., having travelled 61 nautical miles in 16 days.

## MISCELLANEOUS.

A telegram from Saint Louis, Senegambia, on April 13th, 1890, announced that the French had occupied **Segu-Sikoro**, the capital of Ahmadu.—*Le Mouvement Géographique*, 1890, No. 8.

The United States Coast and Geodetic Survey has determined by telegraph the **Longitude of Mount Hamilton** in California, on which the well-known Lick Observatory stands, and found it to be 121° 38′ 42·1″ W.—*Petermann's Mitteilungen*, Bd. xxxvi. No. 14.

The sixth number of the twenty-fourth volume of the *Zeitschrift der Gesell. für Erdkunde zu Berlin* is a useful book of reference. It consists of a **List of Selected Geographical Publications**, which have appeared between November 1st, 1888, and December 31st, 1889.

The Russian Government proposes to construct a **Railway across the Caucasus**, to connect Russia with the Transcaucasian lines. Its length will be about 125 miles, and the necessary expenses have been provisionally estimated at £4,000,000. *Revue Française*, April 15th, 1890.

A **New Port** has been opened at Ensenada, three miles from the city of La Plata. The *Boll. del Ministero degli Affari Esteri*, Rome, March 1890, states that it contains quays having an area of 7,894 sq. yards, and warehouses capable of containing 1,473,100 tons of goods.

Baron Nordenskiöld announced at a meeting of the Stockholm Academy of Sciences that a **Swedish Scientic Expedition** will be despatched this summer to Spitzbergen. The expenses will be borne principally by Baron Oscar Dickson and the publisher F. Beyer.—*Deutsche Rundschau*, Jahrg. xii. Heft 9.

The general line of the **Frontier between Abyssinia and the Italian Territory, Eritrea**, has been fixed by a treaty signed on September 29th, 1899. A joint commission composed of two representatives of either nationality will carry out the delimitation in detail.—*Petermann's Mitteilungen*, Bd. xxxvi. No. 4.

On February 15th an expedition, under the leadership of Professor Angelo Heilprin of Philadelphia, set sail from New York. Its object is the geological, zoological, and botanical **Exploration of Yucatan.** The expenses will be borne by the Academy of Sciences in Philadelphia.—*Petermann's Mitteilungen*, Bd. xxxvi. No. 4.

The construction of the **Railway from Ismid to Angora** (Asia Minor) is being actively carried on. The *Revue Française*, June 1st, 1890, stated that the first twenty-five miles were to be opened on June 2d, making with the line from Haider Pasha over 80 miles in working order. The remaining 31 miles are to be completed by October.

**Regulation of the Hoang-ho.**—The Chinese Government is spending large sums of money in regulating the bed of this river, to prevent the recurrence of the disastrous floods which have caused such terrible loss of life and property. The governor of Shan-tung has estimated the sum required in his province alone, for the strengthening of dams, the rebuilding of stone walls and the purchase of dredgers, at about £934,000. Part of the waters of the river are to be diverted into the Tu-hai. The mouth is at the present time deeper and broader than it formerly was, and, since the last breaking up of the ice, the erection of strong dams extending $1\frac{1}{2}$ miles below Hanchin-yuan has been commenced, with the object of maintaining the present dimensions of the channel.—*Deutsche Rundschau*, Jahrg. xii. Heft 9.

## NEW BOOKS.

*Specially Surveyed Roads in Scotland, being a Guide for Cyclists, Pedestrians, and Sportsmen, with Index Map of the Routes and Sectional Touring Map of Scotland.* By G. Roland Brayshaw. London: George Philip and Son, 1890. Tables xxviii. Pp. 32. *Price* 5*s.*

The ingenuity of the idea of representing the natural surroundings of the principal roads in Scotland is worthily matched by the skill and technical finish with which it is realised.

Each "table" extends across a double page, and takes in from 100 to 150 miles of road. The page is traversed by nine perpendicular lines an inch apart, the space between successive lines representing one mile. A compressed description is printed across the page, and under it there is a section of the road in question showing its general character as regards gradient and surface, though not according to a fixed vertical scale. The novelty of this system of representation induces us to copy the "Key to the Indicators."

"The routes pass over a scale of 8 paces, representing 8 miles of road, 4 miles being on either page. The description of the route is worded so that the towns, villages, and landmarks occur upon the scale according to the distances they occupy on the road. . . . A straight line extending under the route descriptions denotes that the road, so far as the road extends, is fairly level and of good surface. Dotted lines denote rough roads, sandy, or otherwise bad, but fairly level. The arrow denotes ascending road, as far as the arrow extends; the gradient being indicated in proportion to the number of "flights" on the arrow shaft. . . . Notched arrows denote rough ascents or descents. Undulating smooth lines denote undulating smooth roads, the undulations being proportionately denoted by the curvature of the lines. . . . The small wheel after any town denotes the residence there of either smith or mechanic competent to repair minor casualties happening to cycles. When this sign (‡) follows the name of any village or hotel, it signifies it to be worthy of notice, either for the beauty of its surroundings, or the excellence of its comforts."

All the roads described in detail, amounting to close on 4000 miles, were cycled over by the author, who gives some valuable information as to misplaced milestones, fine pieces of scenery, and the like. About 1000 miles of road are included as appendix tours; and, in all the cases we were able to test, the information is accurate.

We would suggest to Mr. Brayshaw to use special marks on the route tracks to denote bridges, sudden turns, and the junction of other roads. These would greatly help the traveller in "keeping his place" in the book as he goes along, and would enable him to correct mistakes which may occur in the description. More numerous sea-level altitudes should also be indicated—we would suggest every 100 feet—and a few lines as to the use of the aneroid would add greatly to the completeness of this unique and useful guide.

*Northern 'Ajlûn, "within the Decapolis."* By Gottlieb Schumacher, C.E. Palestine Exploration Fund, 1890. Pp. 208. Illustrated. *Price* 3*s.* 6*d.*

This memoir on the districts of Irbid, or northern part of the tract sometimes called 'Ajlûn, lying to the south-east of the sea of Galilee, is quite a business-like work. There is no book-making in it: it contains no superfluous statements—hardly a word could be spared; but it is succinct, graphic, instructive. The district dealt with in Herr Schumacher's present survey covers about 220 square

miles, lying between lat. 32° 30′ and 32° 45′ N., and between long. 35° 35′ and 35° 55′ E., the northern boundary being the Yarmûk River, and the western the Ghôr of the Jordan. This tract of country is full of deep valleys and intricate defiles, till about forty years ago the secure lurking-places of the Es-Sa'âidi Bedawin, a famous clan of freebooters, who were at length exterminated by the Turks. Even yet it is not a district in which security can be safely counted upon, and Herr Schumacher's guides turned out to be highwaymen, of whose politeness and knowledge of local names he speaks very favourably.

The author gives us plans and drawings of the remains of the important ruins of Umm Keis (better *Um-Kês*), the ancient Gadara, famous for its hot springs,—in ancient times second only to those of Baiæ; and of Capitolias, now Bait Râs, a city mentioned in the *Itinerary* of Antoninus, and the seat of a bishop in early church history; and many drawings of archæological and other remains from other sites, such as the dolmens of Kefr-Yûbâ and El-Eqlâ'a el-Matrakibât, from Irbid—anciently Arbela: perhaps the Beth-Arbel of Hosea (x. 14), and frequently mentioned by Josephus as a place that played an important part in the Jewish wars,—and from other sites. All the drawings, of which there are from seventy to eighty represented by woodcuts, are prepared in the most satisfactory and instructive way, as only a practical civil engineer or architect could be expected to produce them. They add immensely to the value of the work.

Among his discoveries Herr Schumacher met with two new fields of dolmens, both covering a considerable extent of ground, and consisting of many hundreds of these structures. The greater number of those—800 to 1000—at Kefr-Yûbâ lay still undisturbed, and the explorer opened several specimens, and under a depth of about 14 inches of earth found ashes mixed with small pieces of burned coal, "with what were undoubtedly the remains of decayed bones, now nearly fallen to dust." This supports the view advocated by the late James Fergusson, in his *Rude Stone Monuments*, as to the original purpose of these monuments.

After a description of the principal town of a Náhîët or division, of which there are five, the remaining villages, roads, streams, etc., in each are arranged alphabetically. There is an excellent map on a scale of $\frac{3}{8}$ inch to the mile.

The Arabic text of the names is given in the index; and though "the modern Arab dialect of Palestine differs both in orthography and etymology from the classical language," as the editor informs us, we can hardly follow the consistency of many of the transliterations into Roman letters: Sâkhui (pp. 193 and 126) may possibly be misprinted for Sâkhni as represented in the Arabic; the final Arabic ة has, of course, the sound of *t* in Birket, Jöret, etc., and the guttural and *fat'ha* sounds in many other cases, but one is perplexed to find it transliterated in so many different ways, and yet always represented with the same double-dotted sign; the same letters that are transliterated *Jôret* in two places are made into *Jôrt* in a third; *Jelameh* (p. 169) is written in Arabic exactly as *Jelâmet* is elsewhere (p. 136); and *ei* and *í* seem to be used indifferently for the Arabic *ya*, where *í* alone would meet most cases. An index of this sort should be produced with perfect accuracy and made easily intelligible by the insertion of vowel-signs.

*Handbook of British North Borneo.* London: William Clowes and Sons. London, 1890.

This book gives details of the present state of the territory of the British North Borneo Company. It gives full information concerning its resources, of a nature to interest planters, traders, or investors, as well as the general reader. It will, no doubt, astonish many people to know that this chartered company of traders owns

a territory larger than the island of Ceylon. Under the various heads of climate, products, minerals, agriculture, etc., some very interesting facts are set forth. The book is embellished with maps and pictures, some of the latter evidently borrowed from *The Last Voyage of the "Sunbeam."*

*Mungo Park and the Niger.* By Joseph Thomson. Maps and Illustrations. London and Liverpool: George Philip and Son, 1890. Pp. 338. *Price* 4*s.* 6*d.*

This is the best example we have yet seen of the "Explorers and Explorations" Series now being brought out by Messrs. Philip under the editorship of Messrs. Scott Keltie, H. J. Mackinder, and E. G. Ravenstein. It should have been the pioneer volume, for in every respect it carries out the admirable programme which editors and publisher have in view.

Circumstances have in this case combined in producing a most pleasing, as well as satisfactory, result. The romantic incidents of Park's career lend themselves to picturesque treatment, and their dramatic representation has lost nothing at the hands of his sympathetic countrymen. Moreover, the sterling geographical results of Park's explorations have been fully appreciated by his fellow-worker in the Niger basin. No writer more competent in every respect could have been found to deal with the subject of Park's travels. We like the idea of an explorer describing the explorations of another explorer in the same field of work. In this particular instance both the biographer and his subject are Scotsmen, whose relative rank in the history of African exploration and whose aspirations and achievements are comparable. There is this contrast: Park is an example of the earlier explorer in Africa, whose judgment was fettered by the ideas that prevailed at his time and whose obstacles were far greater than they would have been at the present day; whilst Thomson is the embodiment of the modern explorer.

The incidents of Park's two journeys in the Niger basin read like a romance. The enduring courage and determination of the man were powerless to overcome some of the difficulties which he encountered; hence, he was called upon to face privations and dangers that scarcely find a parallel in the history of African exploration,—which is saying a great deal. Undoubtedly, as Mr. Thomson points out, his mistake in taking only Europeans on his second expedition from the West Coast was the chief cause of the failure of his mission and of his disastrous end; but the delay caused by the home authorities in despatching the expedition until the dry season was nearly past was, at the same time, an equally inimical factor.

Whilst the history of Park's career gives the motive and individual impress to the book, it does not limit its scope. It is, rather, the story of the Niger which Mr. Thomson essays to tell. Though Park is the leading character in the narrative, all those whose explorations or arm-chair services have materially contributed to unravel the mystery of the geography of the Niger are also alluded to. Mr. Thomson's estimate of their various services is in itself a valuable geographical contribution. He pays a well-deserved tribute to M'Queen, whose far-seeing theories and prophecies have been largely demonstrated and realised.

The Niger has been essentially the field of Scottish enterprise. At the present time, when the development of Africa has been seriously undertaken by the European Powers, it is well to remember the legacies that have been left to us by our countrymen. Mr. Thomson speaks with authority and plain common sense when referring to the political situation in the Niger basin.

The maps by Mr. Ravenstein, it is scarcely necessary to add, are in themselves of special value.

*Through Gasa Land, etc.* By Parker Gillmore ("Ubique"). London: Harrison and Sons, 1890. Pp. 349.

The author has travelled in many lands. In Gasa-land and on the High Veldt he appears to have discovered a happy hunting-ground. His narrative of adventures and sport, which in places recall the fictions of Rider Haggard, will appeal to those who are like-minded. It is interesting enough in itself, and therefore one cannot but regret that the author should have thought fit to introduce extraneous matters of a political character, on which he discourses with more confidence than intelligence. He tells us, on page 329, that "without the assistance I afterwards rendered the Bechuanas against the freebooting Boers, their country would not be British territory, nor the trade route from the Cape of Good Hope to the interior of tropical South Africa open to our commerce." Among the "many thousands of my own countrymen" who are supposed to know this, we regret not to have been before included. Whatever Mr. Parker Gillmore's political services may have been, there is no doubt that he is a successful sportsman.

*Henry M. Stanley. His Life, Travels, and Explorations.* By the Rev. Henry W. Little. London: Chapman and Hall, 1890. Pp. 456.

At a time when the name and fame of Mr. Stanley are so prominently before the public, a book purporting to give a complete account of the explorer's work and adventures in Africa is sure to be widely welcomed. Mr. Little has been at some pains to describe the varying fortunes, objects, and results of Mr. Stanley's expeditions; and he gives us a very readable account, not of them only, but also of the earlier life of the traveller.

Where Mr. Little appears to us to fail is in not having sufficiently digested the wealth of material at his disposal. The book bears evident signs of haste; it still requires careful revision; whilst the long digressions, especially towards the close of the work, interfere with the effect which the central figure in Mr. Little's narrative should have retained throughout. The total absence of a map of any kind is also to be regretted.

*Mit Stanley und Emin Pasha durch Deutsch Ost-Africa.* Reise-Tagebuch von P. Aug. Schynse. Herausgegeben von Karl Hespers. Köln: J. P. Bachem, 1890. Pp. 88.

Father Schynse accompanied Mr. Stanley's Relief Expedition on its journey from the Victoria Nyanza to the East Coast, associating constantly with Emin Pasha on the way. His journal, which is here reproduced, besides recording the ordinary incidents of travel, professes to give a certain amount of private information in regard to the ulterior objects of the expedition, with which we have no concern. It is on this account that Father Schynse's diary has obtained notoriety in this country and elsewhere. In itself the volume repays perusal.

*Chambers' Scottish Geographical Reader.* Standard I., *Price 6d.* Standard II., *Price 8d.* Edinburgh and London: W. and R. Chambers, 1890.

These are brightly written and very attractive little books, accurately interpreting "the code," and well illustrated. They ought to attract the interest of the little people who cram them up—for of course they will be crammed—to the spontaneous study of geography for its own sake.

Ugongo
Palambata
Wando
Tangasi
Momb
Mabokodes
Ugaruwa's
Kaluinga's
Kaba
Mandi
Makali

# POLITICAL SKETCH-MAP OF CENTRAL AFRICA.

SHOWING THE NEW BOUNDARIES ACCORDING TO LORD SALISBURY'S DISPATCH, JUNE 14th, 1890.

THE SCOTTISH
GEOGRAPHICAL
MAGAZINE.

## A VOYAGE INLAND FROM CANTON.

By Dr. W. G. Dickson.

(*Continued from p.* 373.)

Ping-shek, "level rock" (probably so called from the sandstone strata in the vicinity), is one long street of a mile in length on the left bank of the river. It is under the government of a petty officer or mandarin. The principal feature of the place is the number of boats, all of one size and the same shape—sharp at both ends and drawing three or four inches of water, with a low mat covering. From the number we counted we calculated that not less than a thousand were lying off the town, and hardly a yard of the shore was visible. The place had been visited twenty days before by a party of rebels from Leen-chow, who had burned a hundred shops, and then decamped on hearing that the imperial troops were advancing upon them. These men had come down the main branch of the river, which comes from the district of Lummo adjoining Leen-chow, while the smaller branch, along which the principal trade is conducted, comes from Eecheong. It is annoying to see how easily these marauders can make a raid upon the principal route for trade through the province down a fine rich country, and escape back again into their holes before they can be attacked.

The boats were small, but the chairs were inconvenient and tedious, and as we expected to have of necessity full experience of chair-travelling between Eecheong and Chunchow, we preferred the former, and hired four. These boats are poled along with bamboos carved at the handle. Unfortunately, our first day after any change of boats was always a wet one, and this was no exception, and it was the more inconvenient as the boat's matting overhead was bad, so that during the night we found ourselves sleeping on wet mattresses. This threatened at first to

be productive of illness to one of the party, but fortunately was followed only by a severe cold. After entering the Eecheong River and leaving the main branch to go on to the district of Lummo, the trees overhung the banks and spread nearly across the stream, and grew up the sides of the hills. Here the banks are generally about fifteen to twenty feet above the level of the river, and, as the water never rises above them, artificial means are used for farming purposes, and for the first time we saw a bamboo undershot wheel of about thirty feet diameter, used for delivering water to irrigate the fields. The water is raised by sections of bamboo, laid across the circumference in a slanting position, which deliver their contents into a hollowed piece of wood as they come to the top, whence it flows into the fields. In order to get water-power a barrier or dam is made across the river, with two openings wide enough to admit the passage of a boat; of course the force of the current is doubly strong at these openings. We passed afterwards many of these wheels, some in operation, others stopped by sand and branches, or broken down. The houses about the neighbourhood were pretty and different from those in Canton. The gables being turned to the front, they had two wings and a centre, and at a distance looked not unlike small houses of the Elizabethan order. The men wished to make two nights of it, but we got to the county town of Eecheong about five P.M. on the second day.

We were told that a bridge (the first under which we passed), about 10 miles from Ping-shek, was the boundary of the provinces of Kwang-tung and Hoonam. On arriving at it, we found a small rustic affair of three arches, but on cross-examination we found that it was not on the boundary line, and that we were not in the district of Lokcheong, but of Yoo-yuen, which is conterminous with Hoonam. The boundary is about 10 miles further on, and was not marked by anything we could see, certainly neither guard-house nor custom-house. On nearing Eecheong we ascended a pagoda of seven stories, from which we had a good view of the town. It is a busy, pretty little place, amidst low hills, with a back-ground of mountains, the river, there a small stream, running through it. Here we passed under another bridge, but stopped on the upper side of it, above which no boat can go. We were at once shewn to an inn about 10 yards from the landing-place, at which a large crowd had already collected. This was a fair sample of an inn in China. The house was large and externally had a clean appearance. The interior was a large warehouse-looking place. The floor was stone under a thick layer of mud and filth. On the one side was a collection of packages of cargo and pack-saddles, ready for putting on mules. The centre of the square was lower by about 4 inches, and, on passing this, a strong disagreeable odour of ammonia was perceived. This was not surprising, as a spout above discharged into this open space all the urates and other salts that were ever and anon eliminated from the guests, and if any unhappy guest in ignorance passed straight forward from the door, he ran a chance of being victimised. The ground floor was occupied by mules, and this made the whole place redolent of a disgusting smell. We were shewn upstairs to a gallery round the hall. Here was a suite of four apartments—three

small, with the ordinary planks on tressels which constitute a Chinese bed, and one larger, intended for a dining apartment. The bare brick walls, the rooms partitioned off by thin planking, the floor black with dirt, old cobwebs pendent from the corners, no doors to the rooms, and the general smell pervading the house, all combined to make us draw a comparison with such houses in Japan very unfavourable to the Flowery Land. However, after our late residences with their discomforts, we looked upon these rooms with considerable satisfaction. We got our luggage stowed away, and then proceeded to hold a levée of the people of the town, who crowded round us into the room in a most inconvenient way. But they were all exceedingly civil in their demeanour. We saw, on entering the town, about 18 or 20 soldiers, but none of them visited us. The following morning, at daybreak, we were wakened by the jingling of bells, which became incessant. These bells were tied to the mules used for carrying on the trade between Eecheong and Chunchow. We stayed one day at Eecheong and paid a visit to the county magistrate, Liu, an elderly man, a native of Kwangsi. He received us politely, dressed in his official robes—not as the Lokcheong official did, in his every-day dress. After a short visit, we walked round the walls, which occupied about a quarter of an hour. We walked into the country about 6 miles, towards a high range of hills, in which the Pak-kong or North River takes its rise. These appeared to us to be about 4000 feet high. We found the people repairing the banks of the paddy fields, and everywhere found them very similar in appearance, dress, manners and customs, mode of cultivation and address, to the Chinese about Canton. The majority took little or no notice of us. Others ran to see us, but in the country those were but few. Others stopped working, took a look, spit on their hands, and worked on again. The few women we saw seemed very much frightened. The cultivation was careful and neat, the houses slovenly and dirty. We passed limestone and, in several places, marble, of which, the people we asked told us, there was plenty about. We afterwards passed a *pailow*, or square archway, if it can be called so, the greater part of which was of white marble. The opposite mountains, at a distance of 3 to 5 miles, had precipitous stone faces, cut up by thin silvery lines of falling streams.

The better class of houses, dotted singly over the vale, were very pretty. We saw men fishing—one setting lines for night, one throwing the circular net over the pools, others fishing with rod and bait (the bait being the filthiest thing a man could use for the purpose). Rice seemed to be the article most cultivated. The low hills were not used for anything, and here, as elsewhere in China, it strikes one that much land is wasted, and that capital would do much for the country.

Our arrangements having been made for crossing over to Chunchow by chairs, we started with 46 coolies—20 to carry our chairs, and 26 the baggage. The former were paid 800 cash a chair. We found that, though we had paid for three chair-coolies, only two turned up, and it was quite impossible for these to carry us over. In short, we were done by this inn in every way that inns can do travellers. The coolies are by no means so strong as the regular Canton coolies, and carry on one

shoulder as in Shanghai. However, the inn, or *hong*, proceeded with the utmost regularity. They weighed all the luggage, distributed it in loads, wrote down every load separately, what it consisted of, and the names of the coolies who carried it. They then appointed a man to go over in charge of it, who was to be responsible. The people turned out to see us, and were quite as profuse of bad names as our much-abused Canton friends, making us out children of the devil, or spirits, and in too many cases calling out with vicious impertinence, for here, as well as at Canton, they seem really to have no other names for us. We finally left Eecheong at 9 A.M., and found a broad road of about 12 feet, paved with limestone blocks and with little or no rise or fall. Our expectations of the Lokcheong pass, or the Seoomailing, had been raised by the reports made to us by the Canton merchants who had crossed it, and though it was said to be nothing compared with the grand Tyemailing, we were not at all prepared for the very level road along which enormous traffic is carried on. The whole way across—a distance of 30 miles—is nearly level enough for a line of rails to be laid along it. The hills on either side rise to a very considerable height, and, as far as we could judge, any passage over them to the west must ascend to a height of 1500 to 2000 feet. The low depression over which the road runs appears to be a pass of 6 to 10 miles in length, where the hills are not more than from 300 to 400 feet above the river. The actual ascent from what may be called level road is not above 180 to 200 feet on the Canton side, and from the summit the road runs with a gradual fall down the bed of the stream of the Chunchow valley. The range of hills is not continuous, but a dislocation has taken place, allowing the road to be carried between the two ranges, and not across one of them.

When we take into consideration the amount of traffic which was passing over the road at that time, and that the people at Eecheong told us that coolies were dear because there was little doing, the amount of traffic at the busy season, when the tea is coming over and other goods going back, must be very great. We met 600 mules in an hour and three-quarters, and saw many standing in stables during the heat of the day, and we calculated that we met a coolie carrying a hundredweight nearly every fifteen yards the whole way over. The time cannot be far distant when a railway will take up the work and make what is now a matter of two days a trip of two hours.

The mules were then carrying over hemp and other articles, packed up so that we could not ascertain what they were.[1] The coolies were carrying *chayow*, or tea oil, and canes—small bamboos with two ears. These seem to come from the Chunchowfu country between that town and Ngapeng. The trade in this article had increased of late very much from the sticks being used in Europe for parasols, and in other ways. The first day, after starting at 9 A.M. and walking nearly all the way, we reached the top of the pass about 1 P.M. The road is laid with flat limestone blocks, and is in good repair. The smoothness to which the

[1] These mules were small compared with those in the north, at Chefoo, and seemed pretty well kept. About Chefoo mules are found sixteen hands high.

stones are worn enables the passers-by to take geological notes of the fossilised shells visible in many of them. These are principally bivalves and convolute pectens and corals, many of them very perfect. The character of the country on the Hoonam side appeared softer, though the firs, and foliage generally, were of the same character. Roses were everywhere in blossom and clematis, and many other plants, shrubs and trees of whose names we were ignorant, were filling the air with scent. We reached the village of Leong-teenszu at 4 P.M., and turned into the best inn we could see. The village was small, kept up by the traffic, but the population poured into our room to gratify their curiosity to such an extent that the floor gave way and the whole company fell into a cellar about six feet below. They turned out to be more frightened than hurt. This was no improvement on the inn at Eecheong. Starting the following morning we reached the outskirts of Chunchow at twelve. We had pushed on to be there early—too early, as it turned out. Our luggage did not keep up with us, and was straggling along the road. As we entered the town the shops turned out their inmates, and the streets were lined with people in a state of expectant excitement. We were carried down a bye street to a large inn or warehouse. The lower part was immediately filled with people, among whom were several soldiers. We were asked to go upstairs and into a small room with beds, and boards for walls, and thin boards for doors. The upper part of the house and the galleries were filled with people eager to see us. Presently soldiers began to come in with that swagger and insolence that a soldier, and above all a Chinese soldier, is ready at such times to assume. They tried to, and did at length, break open the door of the room in which we were. We went out to the gallery, and during the rest of the afternoon were made a spectacle for all Chunchow, amidst no small noise. We had walked over from Leong-teenszu, and the heat of the day was great. Our eatables and wine had not come over, and from 12.30 to 8 P.M. we had to undergo a most annoying examination by a set of coarse, domineering, swaggering, cowards of soldiers. Among the mob were always coming and going respectable persons with children, so that there seemed no expectation of any disturbance. Our six hours' trial of patience at length came to an end, and we sat down, about nine o'clock, to dinner. Having no wish for any further acquaintance with Chunchow, we arranged to get away the following morning. The ignorance and strange ideas of these people were shown by their frequently, as they came in, feeling our knees to see if our legs were like horses'. There was considerable difficulty from our want of knowledge of the dialect, which was so peculiar that none of us could understand it. We found that the town is prettily situated on a bend of the river, and is on this side, like Eecheong, the furthest point to which navigation by boat is carried. By ascending a height in the morning we could see over the suburbs, which consist of good houses, shops, and inns, and constitute the larger part of the town. The city proper, enclosed by shrub-covered walls, contains few houses, and is principally made up of trees and large open spaces. It seemed 1½ miles in circumference. Starting at 4 A.M., we had not gone 200 yards when we found our

progress stopped by a chain at the custom-house, beyond which we could not pass until a gun was fired, so had to wait above a bridge of four arches, on the road leading out of the north gate. Outside this gate a review of some of the soldiers was already taking place. Three small camps were within sight, and the larger houses in the neighbourhood of the bridge seemed to be occupied by soldiers as barracks.

We finally got away in two boats. Ngapeng was our destination, said to be 30 miles off, and here we were to change our boats for a large one.

The scenery as we passed down was very fine—sandstone cliffs and flat-faced masses of rock, some perpendicular, some overhanging, down which the water had worn away grooves. On many of the ledges of worn strata houses were built. Sometimes the rock formed the back wall and top of the house. The part of the river in view had always the same loch-like, confined, appearance as near Ping-shek. Slender and graceful bamboos lined the banks. These we saw made up into bundles for exportation. The hills were covered with the shrub, or low tree, which produces the *chayow* or tea oil, as it is called, planted regularly, as far as could be seen from the top of a hill in the neighbourhood of Ngapeng. The quantity of this oil produced must be very large, as the whole tract of country between Chunchow and Loyyang and on to near Siangtan is devoted to its cultivation, and we met with plants in Lokcheong, in the neighbourhood of the coal mines. Ngapeng is a small village on the right bank of the river, at a bend where deep water enables junks of considerable size to lie. Its importance arises from its being at the junction of the river from Chunchow and that from Shing-wing in Kwei-yang, and the depth of water above entailing a change of boats. On the opposite shore is a remarkable mass of sandstone rock, 400 to 500 feet high, with a cave about half-way up. We went into the country (about four miles), and from an eminence the view was very beautiful. The *chayow* on the hills rises in regular rows, and is of a fine green. The farmhouses are substantially built of square bricks, one row flat and then two rows upright. The more substantial were all built with a centre and two gable wings coming forward so as to make three sides of a square. This style, with the curved roofs, gave the houses here, as at Eecheong, the appearance of cottages in the Elizabethan style.

We found that our friends at Chunchow had not deceived us, and we got one of the largest and best boats lying at Ngapeng. A man had been kindly sent across country, by a much shorter road, to make the necessary arrangements. Our baggage was transferred to our new ark, which was to convey us to Siangtan.

This was not so large as the *lo-loong*, in which we started from Canton, but it was a great improvement on what we had lately been accustomed to. The boats have externally a very clean appearance, being made of dark wood varnished, so that the light is reflected from the side. Internally they are clean enough also, and the men are always mopping the loose boards of which the deck is composed. In all the boats on this river, the Loy-kong, both bow and stern are curved up, so as to resemble an Indian canoe. They are long and narrow, with good

wooden coverings instead of matting. The greatest width is about one-third of the length from the bow. They have sails of native cotton cloth. Altogether, they contrast strongly in shape with the boats on the Canton side, but both kinds seem well adapted to the local peculiarities. The rocks on this river are often at right angles to the rapid, which makes a sharp turn, and the bow requires to be strong enough to resist a concussion.

The captain was a very good-natured, simple sort of fellow, but we found in making arrangements that ignorance of the language was a great disadvantage, and we had no interpreter, for even the Canton boys could hardly understand what our sailors said. This seems strange, that the carriers on a high road such as this is, when they are annually carrying over many Canton men, should not have picked up the most ordinary forms of the Canton dialect. We passed a custom-house, on the left bank between Ngapeng and Wing-hing, where a boat was being examined.

The upper part of the district of Wing-hing is of the same sandstone observed before, and contains fine scenery. In the lower part of the district we came again upon coal and limestone. At the villages of Leoo-cheoo-taan, Ta-ho-tan, Sheung-how-kye, Wong-yu-kong, Shatsui, were large depôts of coal. This is generally lying at these places in a coarse powder, to which state it is reduced by manual labour. This powder is mixed up with clay and made into balls of four inches in diameter, and these keep red-hot all night.

The observations we were able to make respecting goitre corroborated those of Dr. Macpherson in India, viz.—its prevalence in limestone districts, or rather among people who drink water impregnated with limestone. Of the women we saw in our walks (and we did not see many) a large proportion were suffering from the disease. We remarked that, in Hoonam, no women were engaged in field labour, or in boats, at this season of the year, when the transplanting of rice is going on, at which occupation many women work in the vicinity of Canton. We saw no appearance of silk or tea in the upper parts of the province, and as we advanced the waste lands on both sides of the river became more and more extensive.

This has every appearance of being a very extensive coal district, and many of the boats which we were constantly passing were engaged in the trade. We arrived at the county town of Wing-hing on Sunday, 5th May, about one o'clock. After visiting a pagoda on the opposite side of the river, from which we obtained a fine view of a country, covered with the *chuyow* shrub, we skirted the town. A detachment of soldiers was in the place, and, in the usual manner, were inclined to take more liberty and exhibit less *lei*—*i.e.* manners—than their fellow-countrymen. We found throughout this district, where not one of us could speak or understand what was said, the words "*put tsung*," or "I don't understand you," the most useful. If they persisted in forcing themselves on us, the words "*put lei*" generally made them slink off. This was a sort of equivalent, as nearly as we could get, to, "Have you no politeness?" or "Do you not understand manners?" And it is a

question which has a wonderful effect, when addressed to a single man in a crowd. In the evening, at Tanchow-wan, we passed a stage erected near the river bank and a large crowd enjoying some theatricals.

We passed, below Wing-hing, the Scoo-ho-how, a river which comes from the prefecture of Kwei-yang. A custom-house is at the mouth of it, out of which all the authorities then present poured to see the foreigners. We did not see many women about, but all we did see had their feet contracted by bandaging.

The following day we passed the county town of Loyyang, on the left bank of the river—a clean-looking place, without much appearance of trade, but with a good wall along the river bank, and at the corner of it a handsome structure like a guild-hall. The great number of boats, which constantly passed us on the river, seemed not to be going to any one large place, but every little village, every creek and rivulet, seemed to be the destined port of from three to thirty or forty. Coal and lime, rice, and other articles were constantly moving on the river. Each coal-pit had a depôt at the water-side, at the point nearest it, and no attempt seemed to be made to collect it at any one large depôt. The country between Loyyang and Hung-chow, the prefectural city of the province of Hoonam, is little cultivated.

For many miles the undulating ground, on a basis of nasty crumbling schist, is very sterile, and bears nothing but scrub, except in the hollows, where a field or two of paddy is laid out. A farmhouse here and there, of no pretensions, or a few collected together into a hamlet round some of these paddy fields and guarded by a great number of wolfish dogs, gives the idea of a sparse population. The number of dogs would indicate a necessity for being on the watch—probably against thieves or river-pirates. Out of the scrub a cock pheasant rose before us, and a fox was seen trotting across one of the paddy fields.

We observed here, and afterwards more frequently, fine pieces of white marble without a vein or spot. No tea is cultivated in this neighbourhood. Our captain was anxious we should fire off revolvers on anchoring for the night, to let thieves know we had them—a very Chinese plan.

Passing small tributaries, little hamlets, and a continuous stream of boats going upwards, we witnessed an immense display of patience on the banks in the shape of Isaac Waltons fishing, with a slender bamboo, a poor hook, and a bit of pork fat, for little sprats which must be the simplest of all known animals to be taken with such devices. We passed through two of the hottest days that we could have expected in summer, and in the evening we were obliged by a thunder-storm to anchor at Loyyang-ho-how, at the mouth of the Loyyang river, a village with the gable-ends of the houses towards the street, like some old English town. The morning opened with a great change of temperature, from 85° to 65°, and rain. We dropped down early in the morning and entered the Siang-kong river, of which the one we had travelled on is a tributary. The pagoda of the large city of Hung-chow was in sight. In Hoonam the pagodas are generally built on an eminence, at a distance from the city. We walked to this one—a distance of a mile and a half—and

found it much wider than any we had been in. Religious service was being performed by a priest, who did not change expression on seeing a couple of foreigners walk in, but, having finished, asked if we wished to go up, and opened the door. There were two stairs inside, crossing one another, and the ascent was gradual and easy. The city lay below us, lying between the Siang and the Wing-shing—the latter a small stream from the west, while the former is a fine stream, taking its rise in the province of Kwangsi, near the county town of Wing-on, in the *fu* of Kwei-lin, the capital of the province.

According to two native maps, a connection between the waters of this river exists at the county town of Wing-on with those of the Kwei River, which passes Kwei-lin and falls into the Canton River. If this be correct, there is probably, though on a very small scale, water communication between Canton and the Yang-tse-kiang. This town seems to be a central station, as one road goes off into Yun-nan and another into Kwangsi and Kwei-chow. The city itself stands about two miles from the confluence of the Loyyang River and the Siang.

A strong west wind, rainy and cold, was blowing; and our boatmen were not much disposed to contend with it, even with the help of the stream, so, after dropping down about 8 or 10 miles, we anchored. Going ashore we found the same sterile-looking ground, the same friable insoluble schist, and low mounds or hills without a blade of grass on them. Firs grew around and seemed to be the only thing likely to grow. The low grounds were covered with water, in preparation for transplantation of rice.

A considerable river from the east added its waters between Loyyang, Hing-chow, and Hang-shan county town, to the already fine river we were travelling upon, and here and there a small stream opened out on the one hand or the other, with a few junks lying at the mouth. From what we could see the greater number of these junks, able to carry 100 to 150 chests of tea with comfortable accommodation for the sailors and charterers, carried on trade at the different small affluents rather than at any one great port on the river.

We passed the county town of Hung-shan on the left bank, but as it was raining heavily and the boat had no occasion to stop, we could only see it from the river. A monastery seemed to occupy a considerable part of the river front, and behind this the city wall was visible, at a distance of 60 yards from the bank. All along this part of the river the nature of the sandstone rock admits of easy working, and broad, well-made flights of steps leading up from the river are frequently passed. Below Hung-shan, on the right, we passed a river which comes from the adjoining province of Kiangsi. The usual custom-house, with flags and village, stands at the mouth.

The river widens out, preserving a depth of never less than 14 feet, and generally over 26, without any visible dangers or impediments. From the very outset it assumes a quieter tone than the North River of Canton, having few or no rapids and no appearance of rocks, and never, so far as can be judged by the marks on the bank, rising as high as the Canton River does.

Between this and Siang-tan we discovered, for the first time, tea growing near the river bank. Opposite San-moon we landed, and went over some plantations, where the first leaves had just been picked. The leaf was large and coarse-looking, and the plant seemed to be pruned so as to grow in long shoots, and had not so much of the shrub appearance as it has about Foochow. Here they dry it with charcoal, but do not manipulate the leaves as at Foochow. We saw the hemp plant cultivated here. We had passed it all along, in small patches only, after leaving Chunchow; a field at a little distance presents a curious appearance when the wind turns up the under side of the leaf, which is white, the upper being green. We could not find a plant in flower, but from the snowy appearance underneath it was probably *B. Nivia*. There seemed to be a good deal of cotton, but whether it was imported or grown here, our ignorance of the dialect, combined with the crowding of the people, prevented us ascertaining. The *chayow* plant was also cultivated here. Boats laden with coal, with a basket at the mast-head to indicate their wish to sell, were going down the stream with us.

When we crossed the river, on our return to San-moon, a large concourse of people collected, and it was amusing to see the peremptory way in which they ordered the boatmen to land us, in order that they might see us. Above, at a village where we neared the shore, and where our captain was well known, they seemed highly indignant at his not bringing us to the shore to exhibit us, and he was in a dilemma, as we were ordering him to go on and his friends were ordering him to exhibit us.

Below San-moon, on the left bank, we passed a pretty temple, perched on a shoulder of a small hill, with a flight of steps leading up to it from the water's edge. It was dedicated to Koonyum, goddess of mercy. Below this we passed an isolated rock in the river, known as the Lion Rock, and below that another pretty temple on the right side standing on a mound, as if cut out of the side of the hill.

We reached Siang-tan about three o'clock. In a quarter of an hour the crush of people from shore on our boat—sides, top, and even inside —became so pressing that we were obliged to "open ship" and be off to the opposite side. Immediately on dropping anchor, or even before, we were boarded by men who wished to serve us by getting another boat to take us on to Hankow, or in any other way. The river is about 700 yards broad, and as there is a pagoda on the opposite side, on a hill, we crossed over with our junk, anchored, and were off to the hill before a crowd had time to collect. From this hill we had a good view of the place. The county town stands on the river bank. The wall, in good repair, is seen abutting on the river for three-quarters of a mile, with a south gate and two smaller ones at either end. The wall can be traced round at no great depth from the river, the city being merely a long parallelogram. Above the city the suburb extends for $1\frac{1}{2}$ miles, with no great depth of streets, but with a great number of junks and boats lying close along the shore and landing place. The houses on the river front are generally substantial, clean, and with an air of prosperity, the landing places broad and good. Of public buildings there appeared

to be a good many, and some seemed, from this distance, fine. The Maanshow-coon temple of Confucius was a conspicuous green-tiled structure, and another with yellow tiles stood out from among many others, whose ornamented roofs covered a considerable space of ground. However, the evening was coming on, but our Chunchow experience as well as the forwardness of the people here, our ignorance of the dialect, and the muddy streets, where no Canton man would come out to speak to us, though we knew, and our servants told us, that many were in the boats, all combined to give us a distaste to combating the active, and too often impertinent, curiosity of the city and suburbs.

One of the touters was anxious for us to come to his *hong*, close to the water, where, he told us, several Canton men resided. It turned out that no Canton men lived with him, and his *hong* was a "little way" from the water, so, as we could not understand him, we resolved to wait till morning before changing our boat. We were told that a small boat could not cross the lake. Rain came on again during the night. Our skipper came with sweet proposals, and finally the *quieta non movere* principle prevailed, and we concluded a bargain with him for $50 to carry us to Hankow. Our captain had been ordered to go over to the city side, at least he told us so, but by this time we hardly believed anything he and his father told us, and made them do what we thought right. We anchored at the lowest gate, at the angle of the city. At daybreak we weighed anchor, and went down about a mile. By this time it appeared that the captain began to learn what carrying foreigners was, and, instead of smiling and calling to people to come and see us, he was afraid of any one knowing we were in his possession. On trying to make our way up again by walking along the bank, we found the path so muddy and slippery that we finally gave up the attempt, and left Siang-tan to itself.

Siang-tan has always been a place of considerable importance since the Hoonam-Oopak teas have come so largely to Canton. It seems to occupy to Chankok the same relation as Fatshan does to Canton, being a resting-place or depôt for the country teas coming from the upper grounds of this province, as well as from Oopak. Here they are transshipped for Ngapeng, as also goods coming from Yun-nan and Szu-chuen and the northern provinces, which come in here across the upper corner of the Toongting Lake. Here also the return goods coming from Canton and the upper parts of this province are sold, and probably large transactions are carried on. The wide river in front of the town was swarming with boats, and there was every sign of a very large trade.

Rain and cold north wind came on, and we made about 10 miles, halting at Kum-szu-wan, a granite quarry and village where granite is cut into mortars for pounding rice, tombstones, etc. A neat little granite pagoda stood at the end of the village. Next morning we started again, and after tacking about for some time anchored in a creek, 5 miles below where we had been the previous evening. The following day was still miserable, with an adverse north wind and rain. After tacking about for some hours we reached Chankok, the provincial capital. The name of the place implies that the town is built on a long sand-bank.

The river is divided opposite the city by two long sand-banks. The city itself is on the level of the water, but it extends back to rising ground, and encloses a large space of ground. The suburbs are not extensive, and are above the city. There appeared to be a number of imperialist junks off the city. The day was wet, and it was raining heavily. Our boatman did not intend to stop, and seemed to dread above all things being obliged to go to the city side, and dissuaded us by every excuse he could suggest from going into the city. The gates were shut. No Canton people were allowed in. He dared not go in himself even to buy a book. He would not carry the letter we had from the Governor-General of Canton, and he had no small boat, and he took care to anchor us where there was none to be got—on the opposite side of the river. We wished to send in the letter, if only as a matter of courtesy; but after weighing the matter duly, the rain and north wind and mud settled it in the negative, and we left on our way to Changsha, the next county town. It was visited, but not taken, by the rebels on their first march north, and henceforth the country everywhere bore traces of their former presence. During the time of our stay there did not seem such activity as at Siang-tan, and fewer vessels were lying off the city, but perhaps this was owing to the weather. We might have changed our boat here, but it was the last opportunity we had, for we found that at the county town of Siang-iin there were no large boats to be hired. The morning after we left, the skipper at last got his masts up, having hired assistance. Up to this time we had been propelled by stern and side sculls. Had we had masts we might have come much quicker. Then, as it turned out, had we kept our masts down we should have gone quicker, as the north wind set in to blow strongly for four or five days, and when once the masts were up the men seemed to give up all idea of pulling.

The river was now about half a mile in width; the country near the banks low but undulating and pretty. The next thing we looked forward to was the crossing the lake. This had been described to us as something requiring more than ordinary courage. The teas had often been reported at Canton to have been injured in crossing it, and we had been advised to hire a large boat to ensure a safe passage.

There is still another county town between Changsha and the lake, viz., Siang-iin. We reached this place on the 16th May. It is a prettily situated town, with an elegant stone pagoda near it, and in sight of another at some distance down the river. We forced the captain to anchor, and landed, chiefly with the view of seeing a temple of Confucius, which rose above the town, with a fine roof of green glazed tiles. The little city and *yamun* seemed to have escaped the rebels, but had suffered a good deal from the river. Crowds soon collected, but were as quiet as could have been expected. We made our way to the temple, and found it a very fine one. A great part of the stone-work in the front and courtyard was of white marble. This seems to be common all through the province and, wherever we met with it, though it was not of fine grain, it was free from spots or veins. There was some good sculpture of animals, birds, and plants, in this temple.

We crossed a breakwater or stone causeway, crossing a sort of small

lake close to the city—probably made by Keenloong, as the pagoda was. This led to the pagoda. We continued round the city wall, and, on going into our boats, the only incivility that any of us had experienced was found to be the appropriation of a bunch of keys out of one of our pockets, by a boy who had been pushing very unceremoniously against us. It was decided to send the offer of a reward immediately into the city, which was accordingly done upon our reaching the boat. The day was hot, and, upon another of the party throwing off his coat, he heard an unusual jingle in it, and on examination it proved that the young thief had thought the keys not worth taking, and had replaced them in another one's pocket—a liberality worthy of the attention of our home pickpockets.

We visited, about a mile below this town, a pottery, where coarse jars, jugs, teapots, etc., were being made. Here, as elsewhere, we found that the curiosity of the people overcame everything else, and we could not get them to understand our questions, which, no doubt, were uncouth enough, even when amended by our Canton servants.

After this point the land became low, and at a distance ahead of us a pagoda was visible, apparently rising out of the water. We sailed down, with this low land on either side of us, while over it we could see water stretching away, on the right to the mouth of the Ping-kiang, on the left to the lake itself. The pagoda we found standing on a mound about 20 feet above the level of the water. Around its base were the remains of a temple destroyed by the rebels. It forms an excellent beacon or landmark for marking the mouth of the river, and was probably originally placed there for that purpose. The natives all over China have a method of combining superstition, devotion, and works of practical utility. Most likely at one time it was on an island; afterwards, at the terminus of a long peninsula; now, it is a considerable way from the end of it. The river has carried down its own banks far out into the lake. After we had left the pagoda behind us about 6 miles, we skirted the east shore of the lake, and neared an island, Lui-shi-shan, or "the hill on the peninsula," and as the shades of evening were darkening, we put in with a number of other junks, and anchored in a small cove formed out of the slaty base of the hill. A plentiful supply of *shanshey*, or spring water, was taken in here, as it is wonderful, in travelling on a large stream like this, how difficult it is to get good water. The river is generally as muddy as the Yang-tze-Kiang. The lake itself holds a great deal of mud in suspension, and the hill water is generally earthy, while the river water is excellent, if filtered.

We walked to the top of the hill, from which we saw the lake at our feet and the setting sun a huge oval of fire in its waters. A good temple, totally ruined by the rebels in 1853, stood at the back of a few houses. From the top of the hill the view of the lake itself was pretty, being enlivened by the numerous sails, coming down the river in a long track and then stretching away one after the other like a flock of geese, straight across the lake to the next headland, the surface of the lake being quite smooth. We counted 230 vessels at one time. A few were dotted over the lake, and on the east side some were entering the Ping-kiang. The

pagoda is named Pak-ii-Ki, *i.e.* "White Fish Embankment," according to our boatmen. The local names of places, especially rivers, are different from those found on maps, so that, unless they be towns, there is little possibility of identifying them.

The following morning we started, and made one of the long string of vessels skirting the east side of the lake. This lake has, in Canton, the credit of damaging much of the tea carried across it from Oöpak to Siang-tan, during the gales which frequently sweep across it. Our passage was placid enough, a gentle breeze taking us across. The whole passage did not occupy twelve hours, and we were never further from land than 3 miles, and then only in crossing the estuary of a river. The track is from point to point of land, keeping to the east of two islands. We landed at one headland, where a boat boarded us, begging alms for the repair of the Toong-tsug-meoo. This temple had been destroyed by rebels. After passing the two islands, the lake narrowed to what we afterwards found was the connecting branch with the Yang-tze-Kiang, though not known to our boatmen by that name. Three miles below the lake stands the city of Yo-chin (Ngokchow). We landed and went round the walls. Here we found that a steamer had lain off the city for three days, and had only left a few hours before our arrival.

The city stands on a rising ground, with a fine west gate and a flight of steps running up to it from the river. We visited the ruins of a fine Taouist temple, Lui-seen-ting, burnt by the rebels in 1852. The interior had been much injured, and a supporting wall on the west side undermined by the river. Copies of the new treaty were posted on the walls. Duties are levied here by a large staff of custom-house officials. We shortly after entered the waters of the Yang-tze-Kiang, and the scenery on the banks became tamer as the river widened out to 1, or $1\frac{1}{2}$, miles in width. Its surface was alive with boats, crossing each other as they tacked from side to side. We anchored late at night in a creek, and did not see either of the county towns of Ling-siang or Kaija, which are not on the banks of the river. The former of these is the last county of the Hoonam province.

We were obliged to go alongside the custom-house at Pakhohow, where our boat was measured by an officer. We passed Sinti, a large place doing a good trade.

The country all about was as flat as at Shanghai, with large tracts of sandy ground. We dropped down in the afternoon to Sin-taan-kow. Thence, next morning, we reached Tun-kow, where we were obliged to anchor on account of a strong north-east wind. This was accompanied by a peculiar haziness of the sky, and in the afternoon we found that everything was covered by a fine sand. So impalpable was it, that, though the air was filled with it, only a thin layer of the heaviest fell on the boat. It is a question of some interest how this is raised into the air to such an extent as to darken the whole country and to continue for three days. In the evening we got away and anchored at Chun-kow, a village on a creek full of boats. There was a strong custom-house staff. The following morning we ascended a hill on the opposite—the left—bank of the river, named Ta-pit-shan, or Ta-chun-shan. On the

top of this we found the remains of a monastery completely ruined by the rebels. Upright among the ruins, with placid countenance, sat a cast-iron figure of Buddha, seated on a lotus leaf. Too heavy to take away and too difficult to break up, or too worthless to sell, or perhaps, thanks to a superstitious awe not to be got rid of by men who have been brought up to think there is a spirit in everything, which is ever more ready to show his anger in resenting an injury than to show his love in patiently submitting to insult, it had been left undisturbed. At eleven o'clock the city of Oochang appeared in sight, gay with banners flying from divers points on the battlements and lying on the right side of the river. On the left was the smaller city of Hanyang, of which little seemed to have been left by the rebels except the old city walls and a new wall of a very rickety appearance, which they had erected so as to enclose it and a height overlooking the city and Hankow.

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## RUSSIAN LAPLANDERS.

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The interest that has sprung up in Russia during the present reign in the study of the various nationalities inhabiting the immense empire under the sway of the Tzar is now bearing fruit. We had recently occasion to speak of the Kirghiz, in connection with the important researches undertaken by General Grodekoff, and now the Laplanders are brought before us in a bulky volume written by N. Kharusine, an active member of the I. R. Society of Naturalists and Ethnographers attached to the Moscow University.[1] The author resided amongst the Laplanders on the peninsula of Kola during the summer of 1887, with the special purpose of studying their manners, customs, faith, and occupations. In presenting his report of the information he has obtained, by personal observation and from the statements of others, he has taken pains to look up and compare what has been written about the subject from the middle of the seventeenth century to the present time. The work presents a very interesting, though rather diluted, account of the past and present state of those small Lapland communities which, widely dispersed under the name of *pogosts*, have to struggle for existence with a terribly inclement climate and the ignorance and superstition, yet more baneful, in which they are plunged. The lot of this poor people, cast on the shores of a frozen sea, is sure to awaken wide-spread sympathy, but considerable scientific interest also must be felt in an exact knowledge of the condition, hopes, and beliefs of human beings who have to endure a polar night of two months and 82° of frost.

In the small space we venture to claim for our note in the pages of the *Scot. Geog. Magazine*, we cannot of course enter into minute details con-

[1] *Russkie Lopari. Otcherki prochlago i sovremennago byta.* 472 pp. 4to. Moscow, 1890.

cerning the life and faith of the Laplanders, but we would gladly select from the interesting work of the Russian ethnographer some characteristic traits, sufficient to give the reader an idea of the subject.

A few introductory remarks are indispensable about the physical features of the country inhabited by the Russian Laplanders, who must be distinguished from their Scandinavian brethren, who, it seems, differ considerably in customs and mental characteristics. This country, forming a large peninsula between 65° and 70° N. lat., and 30°-40° E. long., has an area of 79,200 sq. miles (almost as large as Scotland and England, without Wales, taken together). The greater part (56 per cent.) consists of low marshy plains and swamps, but in the centre there are some mountain ranges, which give birth to many swift rivers and are covered with forests occupying about 37 per cent. of the area of the country. There exist, moreover, as many as 700 small and large lakes,[1] occupying about 7 per cent., or the rest, of the area.[2] Winter descends on this desolate country as early as the middle of September, when the swift-flowing rivers are frozen over first, then the smaller inlets, and finally the whole coast is bound in ice. From the 25th November to the 15th January reigns dreary polar night. Then the thermometer marks about —50° F. in the interior of the country, and seldom rises above —36° on the sea-shore. At the end of April the snow begins to thaw, but no vestige of green appears before the beginning of June, though, from May 24th to the 21st July, the sun does not descend below the horizon. This continual daylight during almost two months is exceedingly trying to those unaccustomed to it. The heat then increases suddenly to 72° F. in the interior of the land, but it is always cooler on the sea-shore. A veritable scourge comes then in the form of myriads of gnats, gad-flies, midges and other insects, which torment equally man and his companion, the reindeer. Besides the latter and his small, but terrible, tormentors, there are the following representatives of the animal kingdom: salmon and other fish in the river waters: cod, turbot, *saida* in the sea waters; partridge, woodcock, different varieties of ducks in the forests and on marshy grounds, as also a number of wolves, bears, foxes, squirrels, ermine, and other wild animals. The flora is represented by pines, fir-trees, low birches, some small shrubs, as the bilberry and cloudberry, and grass of various kinds, but it is the food of the reindeer—lichen and moss—which covers by far the largest area. In some rivers of Lapland pearls of considerable value are found.

No regular census of the population has ever been taken, but it is very roughly estimated at about 2000 souls. The struggle for existence which the Laplander has to maintain is very hard indeed, so that the population is probably dwindling; at any rate there is terrible mortality among the young and the old. In spite of this the reindeer-breeder remains on the whole a simple, timorous, good-natured, and fairly honest creature. The influence exercised lately by Russian merchants, who come to rob him of the fruit of his labour, has not, however, had

[1] The largest lake is Imandra—1720 square miles.

[2] The largest rivers are: Ponoy, Pulonga, flowing into the White Sea; Tuloma, Kola, Petchenga, discharging into the Arctic Ocean.

a salutary effect upon his character; he is becoming distrustful in dealing with strangers and rather inclined to the abuse of alcoholic drinks. The influence of the missionaries, on the other hand, has at present produced no marked effect, though Laplanders are considered nominally to appertain to the orthodox Greek Church. The principal occupations of the Russian Laplanders are reindeer-breeding, hunting, fishing, barter, and the transport of goods. They lead a nomadic life, and at the beginning of the mild season change their abode from the interior to the coast. The most numerous, as also the poorest and the dirtiest, are those Laplanders who gain their living by fishing; the hunter, on the other hand, seems to be the most civilised, as he has a hut in the forest; as to the reindeer-breeders, their number is very small in Russian Lapland, most of them living on the Norwegian side of the frontier. The number of reindeer in Russian Lapland was estimated, some four years ago, to be about 12,700; it is now on the decrease in consequence of epidemics, the ravages of wild beasts, and frequent bartering for liquors. In the summer the reindeer is left free to search for his food, but in the winter he is required to draw his owner in a light *kereja* (a kind of sleigh) over the endless snow-fields.

The hunter in Lapland complains of the disappearance of some valuable game, as, for instance, the beaver, and of the general decrease in the number of animals hunted for their skins. Though the prices of the different skins have risen, the business on the whole is suffering. These are some of the present prices and those of thirty years ago: bear skin has risen from 3 to 15 roubles, arctic fox from 30 kopecks to 2 or $3\frac{1}{2}$ roubles, martin from 5 to 11 roubles, otter from 4 to $7\frac{1}{2}$ roubles.

As already hinted, the principal resource of Russian Laplanders is fishing, but unfortunately this occupation is on the decline. In 1860 the quantity of salmon caught was estimated at as much as 5219 poods (1682 cwt.), whereas now only about 2500 poods yearly (806 cwt.) are obtained. The price has risen from 2 to 5 roubles a pood, but it is not the fisherman but the Russian merchant who is the gainer. How poor these fishermen are may be judged from the cruel necessity they find themselves in, at a removal of their camp or during the journey, to abandon to their fate their sick and dying, leaving them a little water and some provisions. Their dwellings are most crazy and miserable, and their food unwholesome and insufficient, the consequence being that they are much addicted to the abuse of strong drink, which renders them easy victims of the Russian fish-merchant, who preys upon them and holds them in complete dependence.

Laplanders live now in separate families, but they have preserved traces of their former tribal constitution (patriarchal state). They are liberal in the exercise of hospitality, and it seems that even recently the host felt himself honoured by the guest sharing his conjugal rights. They have preserved the tribal divisions of landed property and of fishing grounds, and retain their totems, or *tamga*, as distinctive family marks. Women are called by the name of their husbands; thus a woman may be called Ivan-cara (John's wife), Ivan-agki (John's old

wife), or Ivan-niyd (John's girl), according to her age. Relationship of the same degree is considered to be nearer through the male than the female line. Laplanders do not marry within the fourth degree of kinship, nor with strangers, Russians treating them disdainfully, and religious antipathies causing them to regard Scandinavian Laplanders (who are Protestants) as impure. The bride is bought from her parents, but the price takes the form of presents and one year's service in the house of the father-in-law. The marriage festivities are made at the cost of the guests. In the choice of a wife greater value is attached to the qualities of a good housekeeper than to beauty. Our author enters into full details concerning the wedding ritual, which indicates that the practice of ravishment formerly existed. Laplanders do not treat their women cruelly, but they affirm the man's right to behave himself towards his spouse just as he likes. "My wife is mine," says he, "so it is for me to choose how I will treat her, whether I will love or beat her." Laplanders show affection for their children, but they have preserved the barbarous custom of compressing the head of a new-born child with a handkerchief to give it a round shape.[1]

A considerable part of the work of M. Kharasine is taken up with an exposition of the ancient creed of the Laplanders, who are now, outwardly, members of the orthodox Greek Church. Their pantheon is very populous, and their mythology resembles that of the Finlanders. All these old creeds have now fallen into a chaotic state, and are intermingled with various notions about the Christian God and His orthodox saints. Laplanders retain a belief in witchcraft, and are greatly in awe of their conjurers; they believe in ghosts and the survival of the spirits of the departed, which can be either beneficent or mischievous, and they offer sacrifices to the *manes* of ancestors. But all these practices seem to be vanishing, and Christian ideas are more and more taking possession of their minds.

In conclusion, I am also bound to mention that Mr. Kharasine has devoted considerable attention to the products of the Laplander's creative powers of imagination. He gives many interesting examples of their epic poems, tales, and even lyrics, the latter of which are really very poor. But with these geography is not directly concerned. On the whole we should be very grateful to the Russian ethnographer for the abundant and authentic information he has brought to light about a forlorn people valiantly struggling against such great odds to maintain a wretched existence amid the snows of a desert peninsula.

[1] See the analogous custom among the Conibos and Sipibos in Peru (*Scot. Geog. Mag.* May 1890, p. 243), — a custom found, indeed, among savages in all parts of the world.

# "IN DARKEST AFRICA."

Reviewed by John Geddie, F.R.G.S.

The English-speaking world has for weeks past been suffering from a strong touch of African fever. There is a tingling in the veins at the tale of adventures in the Forest of Pigmies and of discoveries in the Mountains of the Moon; and the nation is as eager to plunge into the contracted region of the Unknown, still left around the sources of the Nile and of the Congo, as in the days when its blood was younger and when adventurers and their rewards were rifer. The chief symptom and provocative of this "weird seizure" is Mr. Stanley's book. His story of the "Quest, Retreat, and Rescue of Emin Pasha" has already fulfilled the promise of being the most popular and run-after of modern works of travel. This phenomenal success is neither to be wondered at nor grudged to the man or to the book. Their faults are the faults of the great qualities that have set them one and the other so conspicuously in the public eye and favour. *In Darkest Africa* is a vigorous and life-like picture of one of the most stirring episodes in the history of exploration. It is full of action and of valour—a veritable battle-piece, showing the struggle of an impetuous and masterful will against the forces of tropical nature. Mr. Stanley writes his mind with the same forthright plainness and vigour with which he cut his path through the jungle of perils and difficulties that lay between him and the Governor of the Equatorial Province. It is easy, here and there, to blame the method or the tone; it is impossible to misunderstand, or to withhold admiration and applause from the work as a whole.

One thing there is great temptation to forget, even while reading the story of Mr. Stanley's journey. It was a "cutting-out expedition," and not a voyage of exploration. The geographical discoveries, and the political results of the three years' travel, many and precious as they were, were incidental rather than essential to the great object for which the expedition was organised—the speedy relief, and if necessary the rescue and convoy to the coast, of the brave man who, according to fragmentary reports that reached the outside world, was still maintaining his ground, but in the direst straits, in the heart of Africa. Above most things, speed in covering the space between the coast and the Equatorial Province was to be considered. This has to be taken into account in judging of the route chosen and the time occupied by the expedition. It is too late to enter with profit into discussion into the respective merits of the Zanzibar coast or the Congo as a base-line of approach to Wadelai. Mr. Stanley's own voice, as we learn, was from the first for the Congo route—provided he could get the assistance of a flotilla of whale-boats for the conveyance of his force to the head of river navigation. The Relief Committee preferred the East Coast; but at the last moment the King of the Belgians interposed, with what was in substance the claim of a lien over Mr. Stanley's services, and a requirement that the Congo route should be that preferred. So that King Leopold, rather

than the leader or organisers of the expedition, must be regarded as ultimately responsible for the selected line and mode of relief—that of the Congo *minus* the whale-boats. Mr. Stanley's thoughts on finding delays and difficulties accumulating about him, after he had fairly entered upon his up-stream journey, were, as he tells us, "not of the pleasantest."

"With my flotilla of fifteen whale-boats I might have been independent; but there was an objection to the Congo route, and therefore that plan was abandoned. We had no sooner adopted the East Coast route than the sovereign of the Congo State invited the expedition to pass through his territory; the Germans had murmured, and the French Government protested, at the idea of our march through East Africa. When it was too late to order the flotilla of whale-boats from Forrest and Son, we then accepted the Congo route, after stipulating for transport up to Stanley Pool, and the loan of the steamers on the Upper Congo, which were now said to be wrecked, rotten, or without boilers or engines, or scattered inaccessible. In my ears rang the cry in England, 'Hurry up, or you may be too late!' and ringing through my memory were the words of Junker, 'Emin will be lost unless immediate aid be given to him'; and Emin's appeal for help, for, if denied, 'we shall perish.'"

This cry rang in the leader's ears all the toilsome and troublesome way to the shores of the Albert Nyanza, and, perhaps, more than all else, made those labours and sufferings in cutting a path through the Congo Forest, that so deranged all calculations as to the time to be occupied on the march, so hard to bear. Another portion of the arrangement which has been as much criticised at home, and which made a formidable contribution to the delays and misfortunes of the Expedition, was the engagement of the services of Tippu-Tib, and his appointment to the Governorship of the Stanley Falls Station. Mr Stanley explains his motives for taking this step. The alternative was to fight Tippu-Tib or to employ him, and he chose the latter.

"His aid was not required to enable me to reach Emin Pasha, or to show the road. There are four good roads to Wadelai from the Congo; one of them was in Tippu-Tib's power, the remaining three are clear of him and his myriads. But Dr. Junker informed me that Emin Pasha possessed about 75 tons of ivory. So much ivory would amount to £60,000, at 8s. per pound. The subscription of Egypt to the Emin Pasha Fund is large for her depressed finance. In this quantity of ivory we had a possible means of recouping her treasury, with a large sum left towards defraying expenses, perhaps leaving a handsome present for the Zanzibari survivors."

As things turned out Emin's ivory-store was scarcely worth all the talk and trouble it occasioned. But Mr. Stanley never looked upon his contract with Tippu-Tib as anything else than a choice of evils. The "African Napoleon" he regarded as a dangerous and faithless weapon which it was better, nevertheless, to try to grasp by the handle—Tippu's greed of gain—rather than by the blade. The most deplorable result of the Arab leader's breach of word was the ruin of the rear column of the Expedition, which Mr. Stanley left behind at Yambuya under charge of Major Barttelot, when he set out with two-thirds of his force for the Albert Lake. Mr. Stanley speaks of the misunderstanding that took

place between him and his second in command, as to the course which the latter was to take in the case of Tippu-Tib and his carriers not turning up, as a "mystery" to him, and a mystery it must remain in the meantime to others. A full explanation is by no means afforded by the terms of the written instructions which the leader left behind, and the mystery is deepened by the ardent desire which Major Barttelot always manifested to press forward at all hazards, and by the conversation—one of many dramatic dialogues in the book—in which Mr. Stanley emphasised the necessity of following him up as soon as possible with the remainder of the men and stores, ending thus: "For me the word is, 'Right Onward'; for you 'Patience and Forbearance.' I want my tea. I am dry talking." Possibly Major Barttelot mistook the gist of this passage :—

"'Now, which would you prefer doing? Travelling backward and forward from camp to camp twice, or perhaps thrice; or have Tippu-Tib with 600 carriers to help your 200 carriers, and march at a swinging pace through the woods on one track straight for the Albert Nyanza?' 'Oh, there is not a doubt of it. I should prefer to get straight away and try and catch you up. Naturally.' 'Well, do you begin to understand why I have been sweet and good and liberal to Tippu-Tib?'"

Barttelot kept waiting for Tippu-Tib (who had no intention of coming). and for the chance of "marching straight away," until disaster overtook him and his column. The history of the rearguard, however, has still to be written. The history of the advance column has been told in these columns and elsewhere so often that it has become familiar as the adventures of Ulysses or the voyages of Columbus. Readers do not need to be told of the 1600 miles march through the forest of the Aruwimi "without having ever seen a bit of green sward of the size of a cottage chamber floor"; of the encounters with Ugarrowwa and his Arab slave-raiders, and with Kilonga-longa and his Manyuema ivory-hunters; of the brushes with the pigmy tribes and with Mazamboni's warriors; of the miseries of "Starvation Camp"; of the final emergence from the gloom of the woods into the sunshine and rolling grass-lands of the plateau west of the Albert Lake; of the meeting near the lake-shore with Emin and Casati; of the founding of Fort Bodo, and of the incidents of the long marches to and from Yambuya to bring up the rear column. Mr. Stanley, in his letters and on the platform, has narrated with inimitable power the strange, eventful, history of his 3000 miles marching back and forth between the Congo and the lake before he was in a position to begin, with Emin and his people in his convoy, the return journey to the East Coast.

The most valuable geographical results of these terrible experiences were undoubtedly the light which was thrown upon the question of the extent, the nature, and the limits towards the north-east of the forest-covered region of the Congo and Aruwimi; the direction, chief affluents, and sources of the latter stream, which, taking the Ituri as its chief feeder, rises close to the western lip of the table-land overhanging the Albert Nyanza, and under such names as the Nevwa, Nowellé, Lukali, and Biyeré, flows in a nearly due westerly course to the confluence with the Congo; and the line of the water-parting

in this quarter between the basins of the Congo and the Nile. Mr. Stanley estimates the greatest length of the Central African forest—from near Kabambarré, Manyuema, to Bagbomo on the Wellé-Makua, in West Niam-Niam—to be 621 miles; and its average breadth to be 517, thus forming a compact area of 321,000 square miles, "exclusive of the forest area separated or penetrated into by campo-like reaches of grassland, or of the broad belts of timber which fill each great river-basin like the Lumani, Lulungu, Wellé-Mubangi, and the parent river from Bolobo to the Loika River." What Mr. Stanley has to say about the scenery and physical features, the flora and fauna, the native tribes of this "rainiest zone on earth" and their customs, will serve only to whet the desire of naturalists and travellers to explore it more thoroughly. The climatological and hydrographical facts he thus sums up :—

"For nine months of the year the winds blow from the South Atlantic along the course of the Congo, and up the Aruwimi. They bear the moisture of the sea, and the vapours exhaled by a course of 1460 miles of a river which spreads from half-a-mile to sixteen miles wide, and, meeting on their easterly course the cold atmosphere prevailing at the high altitude, they descend upon the forest almost every alternate day in copious showers of rain. This forest is also favourably situated to receive the vapours exhaled by Lakes Tanganika, the Albert Edward, and Albert Lakes. While standing in the plain on the verge of the forest, I have seen the two rain clouds, one from the westward and one from the eastward, collide and dissolve in a deluge of rain on Pisgah Mount and the surrounding country. Besides the rains, which lasted ten or twelve hours at a time during our march from Yambuya to Fort Bodo, we had frequent local showers of short duration. When these latter fell, we were sure that some lofty hill was in the neighbourhood, which had intercepted a portion of the vapour drifting easterly, and liquified it for the benefit of the neighbourhood. The rear-guard of the caravan was sometimes plunged in misery by a heavy rainfall, while the pioneers were enjoying the effects of sunshine above their heads. It occurred at Mabengu Rapids, and at Engweddé. Being in the depths of the forest, we could not see any sign of a hill, but such sudden showers betrayed the presence of one in the vicinity. When well away from these localities we would sometimes look behind down a straight stretch of river, and hilly masses 500 feet above the river were revealed to us. The Ituri, or Upper Aruwimi is, therefore, seldom very low. We have seen it in July about 6 feet below high-water mark. In October, one night it rose a foot; it is highest in November, and lowest in December. But it is a stream that constantly fluctuates, and pours an immense volume of water into the Congo. In length of course it is about 700 miles, rising to the south of that group of hills known as the Travellers' Group, and called Mounts Speke, Schweinfurth, and Junker. Its basin covers an area of 67,000 square miles."

All the tribes from the Atlantic Ocean to longitude 30° east in the Equatorial region of Africa possess, according to Mr. Stanley's observations, resemblances in features and customs, with infinite diversities of tribe and language. But he would place 18° east as the divisional line "between two families of one original parent race"; for across twelve degrees of longitude there are boundaries of tribes bearing a most close resemblance to each other. "If one could travel in a steamer from Equatorville on the Congo to Indesura on the upper Ituri, and see the various communities

from the deck, the passengers would be struck, not only by the similarity of dress and equipments, but also of complexions; whereas were a colony of Soudanese, Zanzibaris, Wanyamwezi to be seen accidentally among those communities the stranger might easily distinguish them as being foreign to the soil." All are of negroid type; but the inhabitants of the true forest are much lighter in colour than the dwellers in the grass-land. A contrast to all the other tribes haunting these woods are the dwarf or pigmy races, whose habitat, between the Ngaiyu and Ituri rivers, occupies a space about equal to two-thirds of Scotland. The account given of the type and measurements, the customs and character, the poisoned weapons, the dress, and the dwellings of these diminutive tribes forms one of the most important and interesting chapters of recent anthropological research. They are undoubtedly related to the other dwarfish peoples whom Schweinfurth, Junker, and other previous explorers of the borders of the Congo and Nile basins have seen and described; and Mr. Stanley would identify them with the pigmies of the ancient geographers and poets and with the Bushmen of South Africa. Upon these points much may have to be said by the craniologists and others; but probably nowhere can an archaic race still existing in a state of nature be more instructively studied than among the Wambutti of the Ituri River. Mr. Stanley distinguishes "two species of pigmies"—the Batwa and the Wambutti—"utterly dissimilar in complexion, conformation of the head, and facial characteristics." The Batwa have longish heads and long, narrow faces, reddish small eyes, set close together, which give them a somewhat ferrety look, sour, anxious, and querulous. The Wambutti have round faces, gazelle-like eyes, set far apart, open foreheads, which give one an impression of undisguised frankness, and are of a rich, yellow, ivory complexion." The description suggests a curious African analogy to the "longheaded" and "roundheaded" skulls of the British barrows. These nomads are still in the "hunting" stage of culture, and with their tiny arrows and spears, smeared with poison, they are able to kill the largest game. In height "they vary from three feet to four feet six inches; and a full-grown adult male may weigh ninety pounds."

If it is not necessary to follow closely the steps of the Expedition between the Congo and Kavalli's, still less is it requisite to enter into details regarding the final scenes of Emin Pasha's government at the Equator, and the circumstances under which he abandoned Wadelai and placed himself, with those who were willing to follow his fortunes, under Mr. Stanley's care. It was unfortunate, but possibly unavoidable, that the rescuer and the rescued should have been unable to "pull together." Their natures were "diametrically opposite," and the circumstances under which they had to act and decide were also very different. In repose each of the two men was able to discover the other's best qualities. Stanley became—what he half-humourously complains of Jephson for being—an "Eminist." But whenever there was a call for action, there was friction. It was doubtless under the latter influence that the following impressions of "the Pasha" were set down:—

"The Pasha is in his proper element as naturalist and meteorologist. He is of the school of Schweinfurth and Holub. His love of science borders on fanaticism.

I have attempted to discover during our daily chats whether he was Christian or Moslem, Jew or Pagan, and I rather suspect that he is nothing more than a Materialist. Who can say why votaries of science, though eminently kindly in their social relations, are so angular of character? In my analysis of the scientific nature I am constrained to associate with it, as compared with that of men who are more Christians than scientists, a certain hardness, or rather indelicacy of feeling. They strike me as being somewhat unsympathetic, and capable of only cold friendship, coolly indifferent to the warmer human feelings. I may best express what I mean by saying that I think they are more apt to feel an affection for one's bleached skull and frame of unsightly bones, than for what is divine within a man."

In a happier vein, Mr. Stanley writes:—

"In the fervour of his belief in the imaginary fidelity of his men, and the warmth of his manner, there was a certain nobility which deterred us from argument. His unvarying trustfulness was not convincing; but it deepened our regard for him, and it imbued us with a hope that, though invisible to us, there remained some good in them. We dare not treat these features of a trustful, loving nature, like that of Emin Pasha, with an insolent levity. He is a man as I have said, eminently lovable, and were it only for the pleasure we have oftentimes received in his society, he deserves that what may be said of him shall be delivered with charity at least. For the high though impossible hopes entertained by him, and for the strenuous industry with which he endeavoured to realise them, he deserves the greatest honour and respect."

Doubtless there was much to try the temper of the most long-suffering of men during the long wait at the southern end of Lake Albert, and on the journey to Bagamoyo. If the Congo Forest and its pigmies supplied the chief elements of novelty in the earlier part of the land march, the Ruwenzori group—"the lost Mountains of the Moon"—and the ultimate sources of the Albertine branch of the Nile in the Semliki River, and the Lake Albert Edward were the outstanding discoveries of the homeward journey. From the earliest times these Nile sources have been the chosen place of the romance of geography. Mr. Stanley deals with the historical side of the question in a chapter on "The Mountains of the Moon and the Fountains of the Nile," illustrated by curious specimens of old maps of Africa, taken from Judge Daly's book. One singular fact is that although the snowy peaks of Ruwenzori are the dominating features of the scene for a hundred miles around, none of the travellers who approached them—Baker, Gessi, Mason, Emin, even Stanley himself on his first arrival on the shores of Lake Albert—caught a glimpse of them. One part of the explanation is that the normal condition of the mass is that of being wreathed in mists; as its names signifies, it is the "Cloud Compeller," and the great chasm at its feet, where the Semliki River runs through a hot-house of tropical vegetation, is a fermenting vat of warm vapours, which, among their other functions, feed the "Sacred Springs of Nile" with an inexhaustible supply of moisture. Here is Mr. Stanley's compact account of the Semliki valley and its flanking ranges:—

"Its average breadth is about the distance from Dover to Calais, while its length would cover the distance between Dover and Plymouth, or from Dunkirk to

St. Malo, in France. For the English side we have the Balegga hills and rolling plateau, from 3000 to 3500 feet above the valley. On the opposite side we have heights ranging from 3000 to 15,500 feet above it. Now, Ruwenzori occupies about ninety miles of the eastern line of mountains, and projects like an enormous bastion of an unconquerable fortress, commanding on the north-east the approaches by the Albert Nyanza and Semliki valley, and on its southern side the whole basin of the Albert Edward Lake. To a passenger on board one of the Lake Albert steamers proceeding south, this great bastion, on a clear day, would seem to be a range running east and west; to a traveller from the south it would appear as barring all passage north. To one looking at it from the Balegga, or western plateau, it would appear as if the slowly rising table-land of Unyoro was but the glacis of the mountain range. Its western face appears to be so precipitous as to be unscaleable, and its southern side to be a series of traverses and ridges descending one below the other to the Albert Edward Lake. While its eastern face presents a rugged and more broken aspect, lesser bastions project out of the range, and is further defended by isolated outlying forts like Gordon Bennett Mountain, 14,000 to 15,000 feet high, and the Mackinnon Mountain of similar height. That would be a fair figurative description of Ruwenzori. The principal drainage of the snowy range is to the west, down into the Semliki River, and south to the Albert Edward Lake. The Katonga flowing into Lake Victoria, and the Kafur into the Victoria Nile, are both fed from the eastern face of Ruwenzori. The Mississi River, emptying into Lake Albert direct, rises from the northern extremity of the mountains.

"During our journey southward, through the Semliki Valley and along the shores of the Albert Edward, I counted sixty-two streams which descended from Ruwenzori alone, the most important being the Rami, Rubutu, Singiri, Ramilulu, Butahu, Rusirubi, Rwimi rivers, descending to the Semliki River; and the Ruverahi, Nyamagasani, Unyamwambi, Rukoki, Nsongi and Rusango rivers, pouring into the Albert Edward.

"By boiling-point the upper lake was ascertained to be at an altitude of 3307 feet, and Lake Albert at 2350 feet above the sea; thus making a difference of level of 957 feet for about 150 miles of river. Therefore, besides a strong current which we observed, and rapids, the Semliki River must have a considerable number of great cataracts in its course from lake to lake."

Weather and the aspects of nature change with magic-like suddenness in these regions; and Mr. Stanley notes that while the north-west and west sides of Ruwenzori are "blessed with almost daily rains, and enjoy a perpetual spring, and are robed in eternal verdure, the south and south-west sides have their well-defined seasons of rain and drought, and if seen during the dry season, no greater contrast can be imagined than these opposing views of nature's youth and nature's decay." The very profile of the country changes, and so rapidly is the surface-level of the waters of the Albert and Albert Edward falling, that Mr. Stanley estimates that, at no very remote date, what is now lake will be dry land.

Never, probably, has so strange and motley a procession passed through this strange land, as the company which Mr. Stanley led under these equatorial snows towards the coast. We need not follow them on their further march, adventurous and eventful as it was, from the geographical as from other points of view. Suffice it to say that no

journey of modern times has combined more richly the elements of human and scientific interest—has brought together more materials for enchaining the imagination and increasing knowledge. It will always be a subject of congratulation to the Royal Scottish Geographical Society that it was able, by aid and sympathy, to bear a share in originating and in helping forward the enterprise of *The Quest, Relief, and Rescue*, which is destined to remain a landmark in African enterprise and discovery. The book is, on the whole, worthy of the exploits which it records. A more vivid and entrancing record of travel was never written. If there are signs of haste, the impatience of the public rather than the author is to blame. Mr. Stanley rightly lays great stress on maps as the accompaniment of books of travel; and on his maps much care has been expended. His linguistic tables and his meteorological and anthropological notes are so valuable, yet so brief, that one longs for more.

## GEOGRAPHICAL NOTES.

### EUROPE.

**New Commercial Ports in the Black Sea and Sea of Azov.**—The Russian Government is about to construct a port at Inkermann to replace Sevastopol, which, from 1893, will be reserved for ships of war (*Le Mouvement Géographique*, June 8th, 1890). The work is to be commenced next spring, and will be completed in eighteen months. The port of Batum is to be enlarged, and also that of Novorossisk, which has the advantage of being open to navigation the whole year round, and is to be the entrepôt for grain. Mariopol, now of little importance, is to be the principal port for the export of coal.

**The Black Sea.**—Professor Klossovsky of Odessa has been investigating the physical characteristics of the Black Sea. He finds its area, including the Sea of Azov, to be 147,100 square miles. Its greatest depth lies between Sevastopol and Constantinople and is considerable for an inland sea, being 1166 fathoms. The salinity on the north-west coast is 1·43 per cent., in the open sea 1·76, and at great depths 1·9, whereas in the Mediterranean and in the Atlantic, in the region of the trade-winds, it is 3·7 per cent. The temperature of the air over the surface of the sea is in summer about 72°. In the winter months it rises towards the southern shore, varying in January from 35½° on the northern shore to 43° on the coast of Asia Minor. In summer the prevailing winds blow from the land towards the sea; in winter in the opposite direction. The Black Sea is restless and stormy, for strong winds and gales blow over its shores on ninety days in the year. Professor Klossovsky gives full details concerning the variations of the level of the sea, having obtained records of observations made at nineteen stations during seventeen years. In the summer months the water near the shores stands above, in the winter months below, the mean level. The monthly mean of these variations is only one foot, but the absolute differences of level are very great—in Taganrog nearly 14 feet 4 in. The mean level for the year is nearly constant. Professor Klossovsky considers that these variations are independent of the rainfall, and are due to variations of atmospheric pressure, winds blowing from the land depressing the surface of the sea. It might, then, be expected that a rise of the water on one side of the sea would be accompanied by a sinking on the other side, and observations prove that such is the case. In summer the water is subject to sudden

changes of temperature, sometimes amounting to 14° or 15° in a day. This may be caused, partly by the action of the waves in mingling together the upper and lower strata, and partly by the winds which, blowing off shore, sweep away the warmer water from the surface.—*Deutsche Rundschau*, Bd. xii. Heft 10.

**Quicksilver in Russia.**—It is a fact known to few that Russia has taken a place among the quicksilver-producing countries. At present this metal is extracted at two places, near the village of Kurush in Dagestan, and near the village of Saizef, in the district of Bachmut in Ekaterinoslav. At the former place the ore is said to contain the enormous proportion of 74·7 per cent. of quicksilver. At Saizef, where the ore contains only 0·32 to 4·5 per cent., the pure metal extracted in 1889 weighed 164½ tons. Diamond-boring has lately been adopted, and a fairly rich lode of cinnabar has been struck at a depth of 260 feet.—*Globus*, Bd. lvii. No. 18.

**A Port at Rome.**—The project of constructing a waterway, by which ships might approach the capital of Italy, has occupied the minds of statesmen and engineers from very early times. Some have proposed to regulate the bed of the Tiber, hoping that thereby the floods, which contribute so much to the unhealthiness of Rome and the neighbourhood, might at the same time be prevented, while others have advocated the construction of an independent canal. In *Globus*, Bd. lvii. No. 21, details are given of plans proposed by Professor Oberholzer. He considers that to utilise the bed of the Tiber would be quite impracticable. Its course is too winding, and the large quantities of mud brought down by its waters would necessitate constant dredging, which, along the course of 25 miles between Rome and the sea, would be exceedingly costly. In times of flood, too, the velocity of the stream would prevent vessels ascending the river, and, even were these and other obstacles surmounted, the channel would be too small for vessels of the present dimensions. Professor Oberholzer proposes, therefore, that a canal should be constructed from the coast at Castel Fusano, some 300 yards to the west of the drainage canal of the Marsh of Ostia, to the plain of Due Torri, a short distance to the south-west of San Paolo fuori le Mura. The surface breadth should be 87 yards and the depth 33 feet, and, where necessary, it should be lined with dikes or brickwork. The length of the canal from the shore would be 12 miles, and dams might be carried into the sea far enough out to reach a depth of 36 feet, diverging so as to enclose a roomy basin for vessels. The proposed harbour at Rome would contain a rectangular basin, 1530 yards long by 650 broad, with an area of about 203 acres, and a semi-circular basin, with a radius of 492 yards and an entrance 220 yards broad, its area being about 69 acres. There would be no great difficulties in the construction of this canal, the hardest part of the work being the excavation of the hill of Dragoncello, which consists of limestone. On the other hand, the existence of this and other building stone close at hand would considerably diminish the cost of the undertaking, estimated by Professor Oberholzer at £3,520,000. The writer of the article referred to expects many indirect benefits to accrue from the formation of this canal, such as improved drainage of the Campagna, the extension of manufactures, etc.,—all very problematical.

**The Kola Peninsula.**—In 1887 an expedition was despatched from Finnland to the home of the Russian Lapps, and, in 1889, Dr. A. O. Kihlman, a member of this expedition, made another journey to the country. The following particulars are extracted from *Fennia* (the journal of the Geographical Society of Finnland), No. 3. The greater part of the peninsula is occupied by a plateau, with low hills, intersected by river valleys which radiate from the neighbourhood of the Lujawr lake. To the east of this lake lies the Lujawr-urt, a group of mountains rising to a

height of nearly 4000 feet, which may be looked upon as the furthest eastward prolongation of the Scandinavian range. To the north-east and south undulating country extends for a considerable distance, while to the west, separated by the deep and broad Umpjawr, rise the Umptek mountains, skirted on the west by the shore of Lake Imandra, the largest in the peninsula. The country around these elevations lies 500 to 600 feet above the sea-level, and contains numerous swamps and shallow lakes, from which the water slowly finds its way by a multitude of small tributaries into the rivers. Of these the principal are the Woronje, flowing out of the Lujawr northwards; the Umba, which drains the Umpjawr into the White Sea; and the Ponoy, which runs in an almost easterly direction into the White Sea. Eastwards of the line Woronje-Umba, no elevations of any importance are to be found. At first the streams meander through swampy hollows of slight declivity, but, as they descend, they form dry and level banks, bordered by birches and scattered firs and pines, and, at a distance of 6 to 20 miles from the sea, excavate deep beds in the rocky substratum, forming rapids and waterfalls. The *tundras*, or treeless plains, covered only by mosses and lichens, are confined chiefly to the northern and north-eastern parts of the peninsula, for the beech has a more northerly limit than has hitherto been assigned to it. Along the banks of the rivers this tree grows still further north. Another treeless tract is said to exist on the south side of the Ponoy River; whether caused by elevation or other local circumstances has not yet been ascertained. Coniferous trees grow south of an irregular line running from the town of Kola to the entrance of the White Sea. Besides these, the dwarf beech, juniper, and other stunted trees are occasionally met with. The base rock of the peninsula consists of granite, gneiss, and slates: the mountains between Lake Imandra and Lujawr are of nepheline-syenite, and in the south and east there are small, scattered, deposits of quartzite, dolomite, and sandstone, probably of the Devonian formation.

Dr. Kihlman gives some interesting information regarding the reindeer. One animal harnessed to a sleigh draws a load of 160 to 200 lb. His speed and power of endurance vary greatly with the temperature, reaching a maximum at freezing-point. The speed in favourable weather is $3\frac{1}{2}$ to $5\frac{1}{2}$ miles an hour for long distances. With relays of animals, 50 to 56 miles may be traversed in the day. Every third or fourth day the reindeer requires a day's rest, and after ten or twelve days must be left unemployed for a longer period.

## ASIA.

**Coal and Petroleum at Quetta.**—Mr. Oldham, of the Indian Geological Survey, has reported to his Government on the presence of both coal and petroleum in the neighbourhood of Quetta, where at present wood forms the only fuel, a considerable amount of destruction of the forests being the result. A survey of the Hernai Valley and vicinity has satisfied Mr. Oldham that sufficient mineral oil can be obtained here to supply locomotives with motive-power for many years to come. At Khattan the supply is believed to be very abundant; and at Spin Tunghi, in the Murree country, there are indications of great promise, although boring operations will have to be resorted to before a definite opinion can be expressed regarding the capabilities of the district. Oil has also been discovered among the Suliman Hills, and the elevations around the plain of Quetta contain numerous thick coal seams.

**The Indian Marine Survey.**—The annual report of this survey is before us, showing, as usual, a record of much useful work. Commander Carpenter's term of service having expired, he has been succeeded by Commander Hoskyn, and

several other changes have taken place among the officers. In April 1889 the survey of the Sacramento Shoal, off the Godavari delta, was completed, soundings having been taken up to 100 fathoms, a depth reached six miles seaward of the shoal. The *Investigator* then sailed for Port Blair, and as her course crossed the two lines of deep soundings made in 1888, the opportunity was taken of ascertaining if these lines lay evenly across the bay, as they were supposed to do. This new line of soundings showed that the contours crossed were correctly laid down upon the map, and the others, reasoning from the results thus obtained, are most probably also correctly charted. On arriving at Port Blair a boat party, engaged on an examination of Diligent Strait, was picked up, and afterwards soundings were made around Sir Hugh Rose Island and over Minerva Ledge, and the 100-fathom line between the two ascertained. Jane's Patch was looked for, but was not found, and is now declared not to exist. Macpherson's Strait was also visited, and the iron poles, fixed to denote the presence of shoals, being found in a damaged condition, were replaced. South Sentinel Island was visited, and its correct size and shape ascertained. Here a collection of robber crabs was made, and three were conveyed alive to the Bombay Natural History Museum. Of three sent to the British Museum only one survived to reach its destination. Leaving this island, the *Investigator* sounded over the submarine ridge lying between the Ten Degrees Channel and the Nicobar Islands, and its extension northward, farther than had been previously supposed, proved. Colombo was next visited, after leaving which a sounding of 346 fathoms was got just outside the 100-fathom line, and another of 1466 fathoms half-way across the Gulf of Manar, the latter being the greatest depth hitherto found in that gulf. Underut Island, in the Lakadivh Archipelago, was then sailed for and examined. It was found not to exceed two-and-a-half miles in length by only a few hundred yards across, yet its population amounts to over 4000 souls. Here some observations of the sun were made, an approximate latitude found by sea horizon, the land sketched in by sextant angles, and some soundings taken. Much the same course was followed at Kiltan Island, and after the chronometers had been verified on the ship's return to Bombay, these islands were found to be about a mile and a-half out of the position in which they are charted. Some deep soundings were made off Padua Bank, and careful examinations conducted off Chaul, to ascertain reported mistakes in the charts, but everything was found to be correctly laid down. On May 13th Bombay was reached, and the surveying officers and chart-room staff proceeded to Poonah to work up results, Surgeon Alcock going to Calcutta to pursue his natural history investigations in the museum. His work among fishes has had fruitful results, no fewer than forty-four entirely new to science and sixty-two new to Indian waters having been discovered in the course of his investigations. During the summer some observations on the tides were made on the Krishna light-vessel. The spelling of names of charts received careful revision, the forms used being those of Sir W. W. Hunter, and *The West Coast of Hindustan Pilot* (1880) was gone over with a view to a corrected edition. On 1st October the *Investigator* again received her full complement of officers and men, and on the 21st Mr. Warden sailed in a steam cutter in order to examine the Thana Creek.

On 25th October, the *Investigator*, now under command of Commander Hoskyn, left Bombay, sounded over Angria Bank, and proceeded to Kalpeni, one of the Lakadivh Islands, where the position of that island was ascertained. The Noor Braband Reef was next sought for, and its non-existence proved, 1100 to 1200 fathoms being got where it was reported to lie. After calling at Colombo, a series of soundings were made off the south of Ceylon, and the 100-fathom contour line, hitherto very vague and unsatisfactory, correctly laid down. An unsuccessful

search for shoal ground of 14 fathoms was made six miles south-west of the Great Basses Light, the least water got being from 29 to 31 fathoms. Although the operations here failed to confirm the presence of the reef, this negative result has not been held to prove its non-existence, as the weather prevented any extended search. Port Blair was again made for, where a boat and other necessaries were taken on board. Diamond Island, in the mouth of the Bassein River, was reached on 21st November, and a boat party, under the command of Lieutenant Gunn, left to make a survey of the river. From the report of that officer, it appears that he sounded over 144 square miles of water, and completed a survey of 6 miles of coast-line. A tide-pole was also erected at the north end of Diamond Island and another at the Alguada Lighthouse. On the 30th November the *Investigator* reached Table Island, one of the Cocos group, and a survey of these islands was commenced. Mr. Prain, who had taken his passage with the survey from Port Blair, was, along with Surgeon Alcock, landed on Great Cocos Island, where they pursued their natural history researches. Gopalpur was the next point made, and an examination of the coast of Ganjam towards the south was undertaken. Based on the East Coast Secondary Series of the Great Trigonometrical Survey of India, this part of the work had been pushed on without interruption up to the date of the report.

During the season eighteen soundings of over 1000 fathoms were made, and tidal observations conducted, chiefly with a view of obtaining reductions for the soundings.

The trawling operations of this survey have seldom been fortunate, and those of the past season did not pass off without accident; yet Surgeon Alcock's report on his natural history work is ample, and is the best and most interesting we have yet seen in this department.

**Tibet.**—M. l'abbé Desgodins has returned to France from Tibet, where he has lived as a missionary for thirty-four years. The exclusion from the country of missionaries and explorers is due, he thinks, to Chinese influence. With regard to the Dalaï-Lama, it seems that he is not supreme pontiff of all the Buddhists, but is simply the head of the sect of the Gelupkas, or Yellow Lamas. The population of the capital, Lassa, is 15,000, including Chinese, Nepalese, natives of Kashmir, and Mongols. The central government of Tibet is Chinese, and is administered by three commissioners, assisted by seven mandarins and an army of occupation consisting of 4000 men, which is stationed in detachments over the country up to the frontier of Nepal (*Compte Rendu* of the Paris Geog. Society, No. 6, 1890). In a note sent by the Abbé Desgodins to the Paris Society of Commercial Geography (*Bulletin*, tom. xii. No. 3) the commerce of Tibet is discussed. All classes are possessed by a passion for trade, but they deal rather as brokers than as merchants. They have no idea of forming partnerships or companies, but each man trades for himself. Nor does he confine himself to any particular articles; he will buy anything that he can make a small profit on. The mutual distrust of the Tibetans shows itself also in the absence of shops. Instead of exposing his goods in the streets the dealer hides them in an inner chamber until a customer presents himself. Another characteristic of the financial condition of the country is that every one borrows. By the Chinese law the interest is fixed at 30 per cent., but every creditor, lama or layman, exacts also a present equivalent to another 30 per cent. and a pledge of greater value than the loan. It is, then, not to be wondered at that a large number of persons are ruined by this usury. The Chinese authorities have not power to enforce the observance of the law on the rich and numerous Buddhist monasteries, which are the chief banking houses.

The Tibetans import into India horses and sheep, wool and woollen goods, borax, a few furs, and small quantities of other articles, receiving in exchange tobacco, printed calico, cloth, and copper goods. This trade might be doubled or tripled, if the tea-planters of India would take the pains to produce a tea to suit the taste of the Tibetans. Out of every 100 animals which return to Tibet from China 95 are laden with tea, the quantity imported annually being worth £64,000. The Tibetan prefers making a journey of five or six months, to fetch coarse China tea, to drinking the delicate Indian teas which are to be had almost close at hand. Since 1880 roubles have begun to appear in the country—a sign that communication has been opened with Russia. Yarkand is the centre of this trade.

**Central Asia.**—M. Venukoff has again communicated news of Captain Grombtchevsky's expedition to the Paris Geographical Society (*Compte Rendu*, No. 10, 1890). In the *Scottish Geographical Magazine* for March, page 155, the Russian explorer's route was given as far as the river Ily-su. He next proceeded by the valley of the Uprang to the banks of the Muz and Raskum Daria. The Muz, a tributary of the Raskum Daria, was till then entirely unknown. Rising in the glaciers of the Mustagh, it runs at first north-westwards and then, turning to the north-east, flows into the Raskum Daria, not far from Chung Takaï. M. Grombtchevsky followed the valley of the Raskum Daria and, crossing the Aghyl-davan pass over the Karakorum range, visited the sources of the Muz. Retracing his steps, he explored the sources of the Tiznaf and, continuing his course westwards, arrived at Shahidula on the Kara-kash. Then, turning south-eastwards along the Kara-kash, he reached the high sandy plateau which separates it from the valley of the Yurung-kash. This was a toilsome journey, performed in mid-winter over passes 16,000 to 17,000 feet high, where the thermometer fell to $-22°$, and occasionally even to $-27°$ F. After losing twenty-five out of thirty-three horses, the traveller was obliged to retire from this lofty region, leaving part of his baggage on the rocks. Passing through Sanju he came to Khotan, where he found M. Bogdanovitch, with whom he went to Nia. M. Grombtchevsky writes that the whole valley of the Raskum Daria has been devastated by the indefatigable and merciless brigands of Kunjut. The mountains bear scarcely any vegetation owing to the dryness of the air, but dense thickets, impenetrable even to a man armed with an axe, cover a few oases in the valley. At an elevation of 13,000 feet only a few stunted tamarisks are found. Wild asses, wolves, foxes, panthers, moles, etc., inhabit the recesses of these mountains. M. Grombtchevsky has made a topographical survey extending over about 680 miles, and has determined the latitude of several places in the valleys of the Raskum Daria, Muz, Kara-kash, etc. At the present time he is continuing his researches in Central Asia, probably on the plateau of Lingzi-thang. He is expected to return to Russia in the autumn. The *Izvestiya* of the Russian Geographical Society, vol. xxv. No. 6, and vol. xxvi. No. 1, contain maps showing M. Grombtchevsky's route.

At p. 256 of this volume Prince Henry of Orleans and M. Bonvalot were reported to have reached Charkalyk. Like Colonel Pevtzov, they wished to enter Tibet, and they seem to have got the start of the Russian explorer. The *Revue Française de l'Etranger et des Colonies*, May 15th, 1890, published a letter from Prince Henry of Orleans, written at Amban Askhan-davan in the Chamen-tag. The travellers left Charkalyk on November 17th, with a caravan of Musulmans, and, after three days' journey across a monotonous, stony desert, reached the foot of the Altyn-tag, a lofty chain of sandy mountains intersected by deep valleys also full of sand. No camel had ever crossed the range by the path the travellers followed, and they were warned that they would be obliged to return. Two passes

had to be surmounted, the Kum-davan (Sandy Pass) and the Tash-davan (Stony Pass). The ascent of the latter was very difficult. The path wound up a steep slope, nearly 1000 feet high, making sharp turns among the loose stones. Four camels fell and rolled down the slope, and the travellers suffered from maladies common at great elevations (the pass is over 17,000 feet high), namely, nausea, headache, and bleeding of the nose. Troops of wild sheep with small horns were seen and, at great elevations, the noted partridge of Tibet, a bird closely resembling a small turkey in shape. The Chamen-tag, a range consisting of stone-covered plateaux, where but little timber grows and the monotony is relieved only by occasional patches of grass or small salt pools, was the next obstacle in the travellers' path. It was from the slopes of this chain that Prince Henry's letter was despatched. He had become quite accustomed to the cold, and did not find a temperature of 5° F. in the day, sinking sometimes to – 20° at night, unendurable. Wild horses and yaks are met with in this range. During twenty-three days the only human beings seen were a party of Kalmucks, perhaps the rear-guard of the caravan of the King of the Kalmucks on its return from Lassa. The guide attempted to lead the French explorers westwards in order to join his son, who was hunting in the mountains, but they perceived the change of direction and, regaining the southern route, followed the track made by the Kalmuck camels.

**Navigation of the Mekong.**—It is well known that this important river is in numerous places obstructed by rapids. These have, however, proved to be less formidable obstacles to navigation than they were supposed to be at first. In the *Scot. Geog. Magazine*, vol. iv. p. 159, it was stated that vessels of moderate tonnage could ascend the river as far as Stung-treng, and now we learn from the *Bulletin de la Société de Géog. Comm. du Havre*, March-April, 1890, that boats can ascend at least as far as Bassac. At Khong, a short distance above Stung-treng, a low chain of rocky mountains, called by the natives Li Pi (Evil Spirits), crosses the river, which is forced to find its way through by seven different channels. In all of these the water forms cascades, the most important being the Prah-mit on the western side of the island of Khong, where the difference of level amounts to 65 feet. But Messrs. Pelletier and Mongeot, planters at Ca-logneu in Cambodia, suspected from statements made by natives that a navigable channel existed, and set out to decide the question. On arriving at Khong M. Pelletier engaged a boatman, who, after much persuasion, took him up the river by a channel in which the fall was comparatively moderate, while the danger from rocks was very slight, since most of them were covered in February, at which time the water is at its lowest level. As the explorers do not mention any obstacles as existing above Khong, it is probable that steamers can ascend as far as Luang-Phrabang. The consequence of this discovery will, undoubtedly, be of the highest importance. Steamers will be able to reach Bassac from Khong in six hours, and bring down the river products which are collected at the capital of Laos and are now carried overland to Bangkok. Whereas the time of transit to Bangkok is about forty-five days and the cost £8 per ton, goods will be conveyed by steamer to Cochin-China in twenty days at less than half the cost. Of course the importation of European articles will be equally facilitated.

## AFRICA.

**Britain and Germany in Africa.**—The agreement between Great Britain and Germany regarding their respective spheres of influence in Africa was signed at Berlin on July 1st. The boundaries as defined by this agreement differ in a few points from those shown in the map published last month.

Westward from Lake Victoria Nyanza the British boundary will follow the first parallel of south latitude, diverging southwards, if necessary, to include Mount Mfumbiro, but returning so as to strike the boundary of the Congo State at this latitude. Mafia is not included in the Zanzibar protectorate.

Between Lakes Nyassa and Tanganyika the line of demarcation is well shown on the map. From Lake Nyassa it follows the Songwe River past its intersection with the 33d meridian of E. long. to the point where it approaches most closely to boundary of the Congo Basin, defined in the 1st article of the Act of Berlin. Thence it runs in a straight line to this boundary, which it follows until it meets the 32d meridian, and then, striking direct to the confluence of the two branches of the Kilambo River, follows the course of this stream to Lake Tanganyika.

In South-West Africa the boundary will follow the 21st meridian of E. long. only as far as its intersection with the 18th parallel of S. latitude, and then, running along this line until it meets the Chobe, will follow that river to its confluence with the Zambezi.

The boundary between Togoland and the Gold Coast Colony commences on the coast at the marks set up in 1886, and thence proceeds due north to the parallel of 60° 10′ N. lat., where it turns westwards along that parallel to the Aka river; it ascends this river to the parallel of 60° 20′; runs along this parallel westwards to the river Dchawe or Shavoe; follows the river till it reaches the latitude of the confluence of the Deine and Volta, to which point it runs; and finally, ascending the latter to its confluence with the Dakka, reaches the neutral zone established by the agreement of 1888.

**Map of the French Sudan.**—The explorations of MM. Levasseur and Plat, Colonel Audéoud and others, were noticed in the *Scot. Geog. Magazine*, vol. vi. p. 209. Their journeys are illustrated by an excellent map, drawn from their observations and published in the *Revue Française de l'Etranger et des Colonies*, May 15, 1890. Capitals and principal towns, boundaries of states and provinces, French posts, etc., are indicated. The scale is 1 : 1,500,000.

**Ascent of the Clarence Peak, Fernando Po.**—This mountain, the summit of which was reached by the Spanish Commissioner Pellon, the British Consul, Beecroft, and the German botanist, Mann, has now been climbed by the Polish traveller, M. Rogozinski (*Compte Rendu* of the Paris Geog. Soc., No. 9, 1890). Starting from Sta. Isabel on Jan. 8, 1890, he attained the summit on the 15th of the same month. The lower slopes of the mountain are covered with forest, consisting largely of tree-ferns and caoutchouc plants. Higher up it gives place to fields of grass. Around the summit the grass is short, and is made gay by numerous small flowers, very like those that grow wild in temperate regions. The crater slopes towards the north. All signs of volcanic action must have vanished long ago. Towards the north-east cape of the island lies a smaller crater, apparently of more recent origin. Perhaps M. Rogozinski will be able to produce some observations giving the height of the Clarence Peak. The heights given by former climbers vary between 9240 and 9325 feet.

**The Valley of the Mangoro, Madagascar.**—M. Georges Foucart, Dr. Catat, and M. Maistre arrived at Tamatave at the commencement of the month of March 1889, and proceeded, as soon as their preparations were completed, to Antananarivo. At the end of April they set out with the intention of making a circular tour in the province of Imerina. They climbed the mountain Tsiafajavona, to the south-east of the capital, which is the highest peak of the Ankaratra group. In spite of its elevation of about 9000 feet, its appearance is by no means imposing, for the plateau from which it rises lies at a considerable height above the sea-level.

The view from the summit is not beautiful but is fairly extensive, seeing that the lake of Itasy, 37 miles to the north-east, is visible. Passing through Sarobaratra, the travellers came to Tsinjoarivo, on the banks of the Onibe, a tributary of the Mangoro. Here stands a palace of the Queen, which no stranger is allowed to approach, but a distant view showed that it consisted only of a few huts of wood, neither larger nor better built than those in the village. Here the party separated, and M. Foucart set off for the Mangoro in a *filanjana*. This consists of two poles, about ten feet long, between which is slung a piece of cloth in which the traveller reclines. M. Foucart would gladly have dispensed with this luxurious vehicle, but a European on foot receives little consideration from the natives. Being informed that it was scarcely possible to descend to the Mangoro by the valley of the Onibe, owing to the long stretch of forest to be traversed and the scarcity of habitations, M. Foucart turned northwards. From Tsinjoarivo to Tsiajompaniry the road is good and fairly even. It passes over the central plateau, where the general level is broken only by a few hills, some of which are clothed with wood, while the rest of the country is bare. The only cultivation is in the valleys, which the Hovas have, with great labour, converted into rice fields, damming up the streams and diverting the water on to the fields. Near the villages, manioc, potatoes, and other vegetables are grown. Occasionally tobacco is seen, but little attention is paid to it, for the Malagasy rarely smoke. The general mŏde of using this narcotic is to pound the leaves up in a mortar and mix them with wood-ashes, and then place a pinch of the mixture between the teeth and lower lip. The villages are numerous and sometimes large. They are surrounded by a ditch and a rampart of earth, surmounted by a hedge of cactus and other thorny plants. These defences, being now unnecessary, are no longer kept in repair. The houses are built of unbaked bricks, 2 to 2½ inches thick. The roof, of rushes or rice straw, projects beyond the walls and protects them from the rain. Externally the villages, with their red houses on a background of verdure, have a pleasing effect, but within the houses are disgustingly dirty, for human beings and cattle live together, the former sleeping on mats laid on the ground or on a raised couch which is reached by a ladder, while the latter are confined in a small enclosure formed by a wall of earth. A few mats, baskets, pots of metal or earthenware, and some vessels of coarse pottery to hold fluids, are the only utensils or articles of furniture. Sometimes stools are seen, but these are only a couple of inches high, so that a Hova seated on one of them seems to be squatted on his heels, his favourite position. Beside the houses are pits, excavated in the ground, in which the cattle are penned at night. Mud, covering the bottom to a depth of three feet, makes them unpleasant pitfalls for the unwary stranger who wanders about the villages after dark. On leaving Miantsoarivo, near which stands the mountain Iharamalaza, an enormous block of granite bare on one side, M. Foucart marched eastwards and soon entered a wooded district. The ground was uneven and the path very bad. Sometimes the party marched over red slippery soil, sometimes along the bed of a stream. The light was obscured or toned down by an entangled network of branches, tree ferns, and lianas. Dead trunks obstructed the path, and the living trees were enveloped with parasitic plants, orchids, and pendent mosses, of a pale green as though bleached by the obscurity. The forest is divided by a broad valley, in which stands the village of Sahanaly. The day after leaving this village a still more arduous march of six hours through the forest brought the traveller within sight of the Mangoro. A steep descent, amidst bushes, shrubs in flower, and guavas laden with fruit, led down to the river, which, at this part of its course, is studded with islets and rocks. On the left bank the spurs of lofty mountains descend to the water. A few hours' journey down the

river is Andakana, and a day's march to the south-east, Anosibe, an important village almost worthy to be called a town. It is picturesquely perched on a hill some hundred feet high, which forms an island in the Mamavo, a tributary of the Mangoro. The 150 houses, of which it is composed, stand in several rows on either side of a street running across the island in the direction of its length. Between this point and the sea the country is mountainous and well watered: the low grounds are marshy owing to the clayey character of the soil. As the elevation diminishes, the vegetation assumes a more tropical character; *ravenalas* appear, and *raphias* become more numerous. At Tandroho stands one of the most valuable woods of copal-yielding trees in the island. M. Foucart struck the coast some distance to the north of the Mangoro, and followed the shore to the town of Mahanoro at the mouth of the river, which consists of two parts; the one stands on an island, and contains a few houses grouped round the residence of the governor, while the other, more correctly named Androranga, has a population of 3000 and is a busy commercial centre. Rice, *rabannas*, *raphia* fibres, caoutchouc, and hides are the chief exports, and woven materials, especially American cottons, salt, and rum are imported. There are many large plantations of vanilla in the vicinity. The river is navigable in a canoe for a distance of eight or nine miles from the sea. Above this point rocks and islets choke the stream, producing rapids and cascades. The natives who inhabit this part of Madagascar are Betsimarakas. Their skin is dark, but not purely black; they have large eyes, short noses, and thick lips. Their colour and general appearance render them easily distinguishable from the Hovas. The men wear vests of *rabanna*, a material woven out of fibres of the *raphia* palm, which are generally yellowish with stripes of blue, and descend to the knees. The women's dress consists of a skirt of *rabanna* and a jacket of cotton, buttoned closely over the chest. The houses are rectangular, and are covered by a roof sloping up to a beam supported by two posts. The walls are made of *ravenala* wood or canes. *Raphia* bark forms the floor, and the doors slide across the openings. The Betsimarakas are gentle and hospitable. They are very indolent, confining their agricultural labours to the cultivation of rice. The only handicraft is the weaving of *rabannas*.—*Bull. de la Soc. de Géog. Comm. de Paris*, tom. xii. No. 3.

## OCEANIA.

**The Mandayas of Mindanao.**—Professor Blumentritt, who has already collected so much information concerning the native races of the Philippine Islands, has contributed an article to the *Mitteilungen der K. K. Geog. Gesellschaft* (Vienna) (Bd. xxxii. No. 4), compiled from the reports of Jesuit missionaries in the island of Mindanao. The Mandayas inhabit the eastern part of this island. They number about 30,000, of whom about 8000 have been converted to Christianity, and are scarcely distinguishable from the Bisayas (the later Malay immigrants) in manners and customs. These natives are remarkable for the comparatively light shade of their skins; they have prominent noses, and on the chin grows abundance of hair, which, however, they pluck out with pincers. In character and disposition they are intelligent, generous, hospitable, and ready to learn. The dress of the men consists of short wide trousers, and a jacket cut away at the neck. The latter garment is worn also by the women, but the trousers are in their case replaced by a kind of *sarong*. Both men and women wear a profusion of ornaments—glass beads, arm and leg bangles, rattles, and plates of metal—to which, on festive occasions, are added teeth of swine and caymans, golden necklets, bouquets of flowers, etc. The weapons in use are lances, sabres, daggers, and small round shields. The Mandayas have also bows and arrows, but do not often carry them when they go forth to war. Their huts are built on piles, or in the branches of trees, and are furnished

with loop-holes, for the inmates must be always prepared to resist attack. They cultivate a small piece of ground, sufficient to supply them with *camote* (*Convolvulus batatas*) and rice, and then retire to their hammocks and chew betel-nut. Each small settlement is under the rule of a chief, who has great power, and is readily obeyed by all his subjects. Punishments for criminal offences are regulated by a fixed though unwritten code, and usually consist of fines of slaves and goods, but, should the convicted man refuse to pay the fine imposed, he is sold as a slave or executed, whatever the offence may have been. Wives are bought, but should the engagement be broken by the bride, the purchase-money must be returned, and a slave paid in addition. The marriage ceremony is very simple. The bride and bridegroom exchange handfuls of boiled rice in token that they will support one another. The Mandayas are involved in continual feuds, among themselves or with the other tribes of the island, in consequence of the practice of the vendetta and the large demand for slaves. They do not fight in open battle, but lay ambushes and fall on their enemies during the night. Their religion is, of course, of a superstitious kind, and their priestesses, who pretend to mediate between them and supernatural beings, have a very profitable occupation. Human sacrifices still take place, the victim being buried in the ground up to the waist and killed by spears.

**The Island of Rotti** lies to the south-west of Timur, between 10° 37′ and 11° S. lat., and between 122° 52′ and 123° 36′ E. long. Its area is about 655 square miles, and its perimeter 126 miles. The substratum belongs chiefly to the limestone formation, which crops out on the surface at many points, especially in the north-east and south-west. Here and there on the mountain slopes a considerable depth of fertile soil has accumulated, whereon grow a few trees and other forms of vegetation. The forest trees have been cut down recklessly, and no new plantations have been formed, so that wood for building is becoming scarce. The volcanic origin of the island is indicated by the existence of coral reefs at an elevation of 150 to 200 feet above the sea-level. On the peninsula of Landu are two mud volcanoes and a salt lake without any visible connection with the sea. The name Rotti strictly denotes the southern part of the island only. The highest elevations do not rise above 800 feet. The rivers in so small an island are, naturally, unimportant, but their broad beds, encumbered by huge boulders, show that large quantities of water must be carried down in the rainy season. The bays do not as a rule afford safe anchorage: the Cyrus Bay alone, at the south-east of the island, is to some extent protected by small islands. Numerous rocky islets lie off the coast, of which the largest, Daï, is inhabited by goldsmiths. The vegetation of Rotti is not very varied, but yet there are a number of useful trees The coco palm is less common than might be expected, and sago palms grow only in one or two well-watered districts. The tree most valuable to the natives is the *Lontar* palm (a variety of *Borassus*), for it supplies them with their principal food. They collect the juice, which flows freely in the dry season, boil it to a syrup, and make cakes by mixing it with crushed maize. The tamarind thrives here, several kinds of bananas, and two varieties of mango. Several woods suitable for cabinet work are found, various species of *Pandanus*, useful for mats, wild cinnamon and indigo, and the *Kasambi* (*Stadmannia sideroxylon*), which yields materials for weaving, and from the fruits of which, in Celebes, one of the ingredients of macassar oil is extracted. But the most important is the *Gewang* palm, its bark, leaf ribs, leaves, etc., being used in building, while pigs and dogs feed on its dry, fibrous pith. The oily nuts of the *Nita* (probably *Hernandia bivalvis*) placed on thin sticks, supply the place of candles. Rice, tobacco, millet, cotton, cinnamon, sugar-cane, and several roots are cultivated. The fauna also is poor. There is a singular native

breed of horses, small, but active and powerful. They are scattered in droves all over the island, and suffer greatly in the dry season from the scarcity of grass, for the owners do not provide them with fodder. Buffaloes are reared for food and to tread up the rice fields before sowing time. The other animals are sheep, goats, pigs, deer, cats, dogs, and monkeys. Among the birds may be mentioned fowls, pigeons, parrots, swallows, crossbills, turtle-doves, and green cockatoos. The *Amphibia* are represented by crocodiles, leguans, and lizards. On the high seas are sometimes seen sperm-whales, sharks, *bêche-de-mer*, turtles, etc. There is no lack of snakes, mice and rats, and bees, ants, flies, mosquitoes, and scorpions are only too abundant.

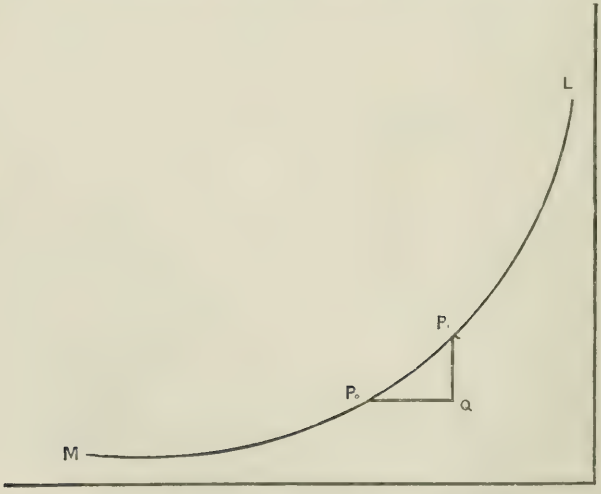
The estimates of the population vary between 54,000 and 62,000. The land is divided into eighteen districts, each under the command of a native rajah, who is responsible to the Dutch authorities. The Rottinese are not of high stature, but are well-made and easy in their movements, and show to great advantage on horseback. Their hair is generally smooth: the colour of the skin dark brown. Their beards are naturally scanty, and most of them pluck out the hair from the face. The women have, usually, graceful figures, dark animated eyes, and a profusion of hair: many have considerable pretensions to beauty. The natives have a peaceful disposition. The vendetta seems not to be established among them, but, on the contrary, every crime and misdemeanour is punished by fines. They are not lazy, but they have not been brought up to work. They are skilful carpenters and smiths, but have a very imperfect knowledge of agriculture and cattle-breeding. They enclose their fields with walls to keep out buffaloes and pigs, lay dams round the rice fields to keep in the water, and drive buffaloes over the soil until it is reduced to mud and slime, but they use no plough or spade, and spend no labour in cleaning the ground from weeds. The women, however, are always busy, fetching wood and water, and cooking, and all their spare moments are spent at the weaving-stool. The dress of the men consists of a pair of drawers and two scarves, of the most fantastic patterns and gaudy colours, one wound round the waist and the other thrown over the shoulder. As head-coverings pieces of cloth of the same material as the scarves are used, or hats of various and curious forms. The women often leave the upper part of the body bare, or throw over it a scarf similar to those worn by the men. Others wear a short jacket, and the lower classes a *sarong*, closely buttoned over the breast, which leaves the shoulders free. A mat loosely thrown over the horse's back and a halter of palm fibres are the only trappings used in riding.

The religion of the Rottinese is similar to that of other Polynesian races. They worship the spirits of the departed, and make offerings of rice, meat, and clothing to ward off disease and other misfortunes. They also believe in a supreme god, whose favour is to be obtained through the mediation of the spirits of the dead. Some have been baptized into the Christian faith, but these differ but little in manner of life from their fellow-countrymen. Wives are bought, the price, which is paid in linen, ornaments, gold, cattle, etc., often reaching the value of over £80. Polygamy prevails. Boys are circumcised at the age of fourteen or fifteen. The dead are buried under the floor of the house, and after the interment a feast is held. Nine days later the priest is called upon to address the departed spirit, and adjure it to appear no more to the living, but rest quietly in the other world.—*Mitteil. der Geog. Gesellschaft zu Jena*, Bd. viii. Heft 3 and 4.

## GENERAL.

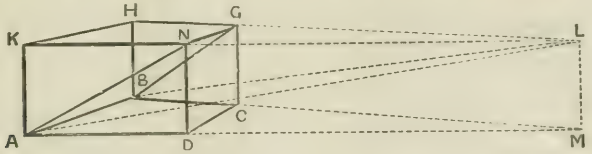
'**On the Heights of the Land and the Depths of the Sea.**'—Professor Penck, of Vienna, finding that his criticisms on Dr. Murray's paper (*vide Scot. Geog. Mag.*

vol. v. p. 442) have not been unhesitatingly accepted as valid, has again written in *Petermann's Mitteilungen*, Bd. xxxvi., No. 6, explaining his objections more fully. It may be remembered that Dr. Murray's method is to draw contour lines of the land rising to certain heights, and on these to erect cylindrical figures of the heights corresponding to the contour lines, whereby a terraced solid is produced, the volume of which is easily calculated. On the terraces of this solid, in the angles between the cylinders, will lie "quoit-like" masses, and for the volume of one of these Dr. Murray obtains the expression $k(A_1 - A_2)$, where $A_1$ and $A_2$ are the areas contained by two adjacent contour lines and $k$ is some fraction of $h$, the height of the inner cylinder above the outer. He shows that, if the line of greatest slope of one of these "quoit-like" masses is rectilinear, $k$ must lie between $\frac{h}{2}$ and $\frac{h}{3}$, and chooses the latter value for his calculation. Herein lies the uncertainty of the method, and it is the value of $k$ chosen that Dr. Penck finds fault with, alleging that the surface thereby necessitated must consist of concave rings separated by projecting edges, whereas there is no sudden break of continuity in the actual surface of the land. Dr. Penck's own method is to take two axes at right angles to one another, mark off on one of them abscissæ proportional to the areas, and erect ordinates at their extremities to represent the heights of those areas. The extremities of these ordinates are then joined, and for this purpose Dr. Penck chooses a continuous curve, which happens to assume a parabolic form with its concavity upwards. This method is liable to precisely the same error as Dr. Murray's, for its inventor has no better reason to assign for his choice of connecting line than that it is the simplest form. He rightly considers the resemblance of this curve to an erosion curve, pointed out by Dr. Supan (*Petermann's Mitteilungen*, Bd. xxxv., p. 19), as purely accidental, repudiating any results to be deduced from the curve, except the volume of the land given by measuring the area within it by a planimeter. And yet he makes use of the curve to demonstrate the form of surface




postulated by Dr. Murray's method. The truth is that, though this may be called an artificial curve, the form of the land surface may be roughly deduced from it. Dr. Penck takes two points on the curve, $P_0$ and $P_1$, and draws $P_0Q$ and $P_1Q$ parallel to the axes of abscissæ and ordinates respectively and meeting at $Q$ (Fig. 1).

The area between these lines and the curve will evidently represent the volume of Dr. Murray's "quoit-like" mass $(A_1-A_2)k$, $A_1-A_2$ being represented by $P_0Q$. Then, he says, that if $k$ equal $\frac{h}{2}$, $P_0P_1$ must be a straight line, and as $k$ diminishes $P_0P_1$ becomes a parabolic arc of increasing curvature, with its concave side upwards. This is true of the curve, but not of the general surface of the land. Let a solid, $HD$, be formed on a base $ABCD$ (Fig. 2), having




a uniform height $h$, and from this let a prism $AGD$ be cut off by the plane $ABGN$. Then, if $ABCD$ be a rectangle, the prism is half the solid and its volume is $\frac{h}{2}\times$ base. But if $AB$ and $CD$ are proportional chords of contours of the land, so that $CD$ is less than $AB$, the volume of the prism will be less than the above product, but will approach this value as $CD$ moves up towards $AB$, while it will decrease as $CD$ recedes, until, when $AD$ and $BC$ meet at $M$, the prism becomes the tetrahedron $LMAB$, the value of which is $\frac{h}{3}\times$ base. Now, if on the base of the quoit-like mass an infinite number of quadrilaterals be described and their breadth indefinitely diminished, their sum will ultimately be equal to the curvilinear base of the mass and, therefore, the volume of this mass must also lie between $(A_1-A_2)\frac{h}{2}$ and $(A_1-A_2)\frac{h}{3}$. We see, then, that $k$ can never have so large a value as $\frac{h}{2}$, if the line of maximum slope is to be rectilinear, and that, if $P_0P_1$ in Dr. Penck's curve be a straight line, the corresponding land surface will be convex; if it be slightly concave, as in the parabolic form that curve actually assumes, the surface will have a vertical section composed of lines at least approximately straight, while to obtain the concave surface Dr. Penck maintains to be correct the curve must be formed of distinct sections. Dr. Penck rejects the form of surface here shown to correspond to his parabolic curve, but the deduction is quite legitimate and is justified by his own application of the curve to Murray's surface. It would thus seem probable that his estimate of the volume of the land is too large, and, as it exceeds Murray's, the latter may not be far from the truth.

Let us now turn to Dr. Murray's calculations. He shows that $\frac{k}{h}=\frac{1+2c}{3(1+c)}$, where $c=\frac{A_2}{A_1}$, and then, by making $A_2$ first zero and then equal to $A_1$, obtains the limits $\frac{h}{2}$ and $\frac{h}{3}$, found geometrically above, between which $k$ must lie, if the quoit-like mass be a portion of a cone, for the equation given is calculated on that supposition. But, like Dr. Penck, he considers that the surface of the land is concave, and chooses his value of $k$ in accordance with this view. By taking different values of $k$ for each quoit-like mass it might be possible to produce a surface the average section of which would resemble an erosion curve; but Dr. Murray takes an average,

wishing, evidently, to obtain a surface not exactly similar to that of the land but containing the same volume. By calculating the values of $\frac{A_2}{A_1}$ for each pair of contours, it will be found that the mean value of $\frac{k}{h}$ is ·408, which is considerably nearer to $\frac{1}{3}$ than to $\frac{1}{2}$. If, then, an average vertical section of the land surface is everywhere concave, the value of $\frac{k}{h}$ must be less than this quantity. Is ·075 too large a fraction to be deducted for the concavity of the surface? This is the question which Dr. Penck should have discussed, and not the general surface, which was not intended to be similar to the actual surface of the land.

With regard to the slope of the ocean bed, we do not feel an equal degree of confidence in Dr. Murray's estimate of the value of $k$. For depths between 0 and 500 fathoms he makes $k = \frac{h}{3}$, but below this limit $= \frac{2h}{3}$. The latter value is chosen for the lower depths on the supposition that "just as the slope of the land increases as we approach mountains, so does the slope in general decrease as we get into deeper water" (*Scot. Geog. Mag.* vol. iv. p. 30). This means that in deeper water the quoit-like masses of water are more convex. To make the question clear and avoid any confusion between the slopes of the surface of the water and that of the solid bed of the ocean, it will perhaps be better to confine our attention to the latter. Now, seeing that the areas of the oceans are on the whole greater than those of the continents, while their greatest depths are nearly the same as the height of the highest mountains, we should expect that the average slope would be more gradual. The value $\frac{1}{3}$ makes the bed of the ocean concave, and if $\frac{2}{3}$ be taken, only one-third out of the ring, the volume of which is $(A_1 - A_2)\,h$, is solid ground, and as this third lies against the outer, and wider, surface of the ring, the ground must be more concave than a quoit-like mass of dry land calculated with the value $\frac{h}{3}$. It may be, then, that Dr. Supan has arrived at a truer result by taking the value $\frac{h}{2}$ throughout (*Petermann's Mitteil.*, Bd. xxxv., p. 19). Of course, in shallow seas, where the strata for which the value $\frac{2h}{3}$ is used are few, this reasoning does not apply with equal force, for the average value is then diminished.

The above remarks apply only to the methods employed and to the surface of the land as a whole, but may require modification in the case of individual continents. Thus, in the case of Europe, the mean valve of $\frac{k}{h}$ approaches more closely to $\frac{1}{3}$ than in the case of the total mass of land, so that a lower degree of concavity is obtained. On the other hand, Dr. Penck's curve will assume very different forms and degrees of curvature according to the relative lengths and position of his fixed co-ordinates. Other causes of the divergence between the estimates are discussed in the *Scot. Geog. Mag.* vol. v. p. 442.

**Movements of Ice in the North Atlantic.**—The Hydrographic Office at Washington has for some years collected information on this subject, and has plotted on the monthly pilot chart a course by which vessels might avoid the ice. The usefulness of this work is proved by the fact that, though this course is some 200 miles longer than the shortest possible route, captains of trans-Atlantic steamers are every year following it more closely, with the consequence that notices of the position of the ice are more rarely obtained. In order to gain a thorough knowledge of the ice and its movements Ensign Hugh Rodman was despatched to Halifax,

Nova Scotia, and St. John's, Newfoundland, to make a careful investigation of these movements, and his report has been published by the Hydrographic Office. The ice is transported from the Arctic regions by two currents : the current flowing along the east coast of Greenland doubles Cape Farewell and flows in a north-westerly direction until it arrives at about 68° N. lat. in Davis Strait, where it unites with the current flowing south along that Strait, and sweeps down to the coast of Labrador, spreading eastwards as far as 52° N. lat. Then, sending off a small branch through the Straits of Belle Isle into the Gulf of St. Lawrence, it rounds Newfoundland and skirts the shore as far as Florida. Off the banks of Newfoundland the Gulf Stream and Arctic current will meet nearly at right angles, and the line of demarcation between them will vary with their relative strength. The supposition that at this line the cold northern current sinks below the Gulf Stream seems to be confirmed by the path of the icebergs. If bergs after calving drifted at once to the south and met with no obstructions, they would accomplish their journey of 1200 to 1500 miles in four or five months, allowing ten miles a day for the speed of the current, and would reach trans-Atlantic routes in December or January. This is, however, a very rare occurrence. In a close season many are obstructed by field-ice, though their great mass enables them to some extent to plough through the floes and break them up. Again, some float very slowly out of Davis Strait, while others, falling at once into the southerly current, are borne along swiftly until they reach the coast of Labrador, where many ground repeatedly, being each time floated again by high tides ; and others, gliding from the edge of the current into warmer water, fall to pieces with loud explosions. Field-ice is formed along the shores from the Arctic regions to the coast of Newfoundland. In high latitudes it forms also in the open sea, and a great deal remains in the Arctic seas, and is not entirely melted during the short summer, so that each winter adds to its thickness. Gales, a rise of temperature, and the action of icebergs break it up during the spring and summer months, and the fragments float out of the Arctic basin, reaching Cape Chudleigh in October or November. Ice begins to form around this cape about the middle of October, and at Belle Isle at the beginning of November, and at the end of that month, or early in December, the whole coast is solidly frozen. Throughout the winter the Arctic drift ice is slowly finding its way southward, reinforced continually by floes detached from the Labrador ice, and reaches Belle Isle between the middle of January and the middle of February. The shores of Newfoundland and the Gulf of St. Lawrence are full of ice by the middle of January, and the river St. Lawrence is closed to navigation from about the middle of November until May. The movements of the ice are greatly affected by the winds, northerly or north-westerly winds accelerating the drift, while north-easterly winds drive the ice against the coast and cause it to become rafted. The ice is cleared off the Newfoundland coast whenever a west or north-west wind blows, and often finds its way into the track of trans-Atlantic vessels as far as 45° N. lat. before the northern ice has passed Belle Isle. Observations, extending over a series of years, show that field ice generally reaches lat. 46° N. in February, its longitude varying between January and March from 46° to 50° W., while bergs reach the same locality from January to April. Last winter was an exceptional season, icebergs coming down in December, followed by field ice early in January. Many bergs, after reaching their southern limit, find their way westwards, while field ice never follows this course. This is probably due to the greater depth of the bergs, which descend into the Arctic current, here covered by a thin layer of the Gulf Stream. Between lat. 42° and 45° N. and long. 47° and 52° W. ice of all kinds is found from March to June, for here the two currents meet. The period at which the ice disappears varies con-

siderably in different years, as the time of its appearance does. Bergs usually disappear between August and the beginning of October, and field ice in April, May, or June.

Ensign Rodman's report contains a table showing the average time of the opening and closing of ports, and charts, on which the usual position of the ice is indicated for each month of the year.

## MISCELLANEOUS.

The Belgian Parliament has voted a sum of 30,000 francs to equip a **Scientific Expedition to the Congo**. Its chief object is to observe the dip and declination of the compass and the intensity of the earth's magnetism. Captain Delporte, Professor of Geodesy and Astronomy at the Military School, will be in command of the expedition.—*Le Mouvement Géographique*, May 25, 1890.

**The Republic of Haiti** has an area of 9232 square miles, and contains 550,000 inhabitants, of whom 27,000 live in Port-au-Prince. The exports, in 1887, were of the value of £1,450,000, and consisted of large quantities of coffee and of Campeachy wood, coco, cotton, hides, mahogany, and honey. The vast mineral wealth contained in the island—iron, tin, copper, and coal—has scarcely been touched.—*Globus*, Bd. lvii. No. 18.

A wonderful example of **Erosion** may be seen in the illustration to Professor Michie Smith's article on the eruption of Bandaisan in the *Proceedings of the Royal Society of Edinburgh*, vol. xvii. p. 70. The valley there depicted was produced by the erosive power of a small stream within the short space of ten months. Its depth, when Professor Smith visited the neighbourhood, was 80 feet, and in some places little short of 150 feet.

The Congo Commercial Company has decided to send out a fresh **Expedition to the Upper Congo** and its affluents, for the purpose of solving the remaining problems connected with the tributaries of this river. M. Alexandre Delcommune will take the command, and, accompanied by six Europeans, will ascend the Lomami, in the steamer *Roi des Belges*, to the furthest navigable point. Thence the expedition will proceed on foot to explore the Urua country and the courses of the Lualaba, Luapala, and Lukuga.—*The Times*, July 1, 1890.

Many of our readers may be interested in having their attention called to a forgotten **Predecessor of The Scottish Geographical Magazine**. In 1830 Daniel Lizars, so well known as a lithographic artist and publisher, issued *The Edinburgh Journal of Natural and Geographical Science*, under the direction of William Ainsworth, President of the Royal Physical Society of Edinburgh, and Henry H. Clerk, President of the Royal Physical and Royal Medical Societies of Edinburgh. The preface of volume i. is dated 11 Gardner's Crescent, Edinburgh, March 1830. Among the purely geographical papers are:—W. Ainsworth, *Description of the Lands of Acquitania*; Alexander Sutherland, *Notes of a Tour in the Island of Jersey*; Captain Ayton, *Oral Information on the Origin of the Goorkhas*; James Bell, *Remarks on the Errors of Oriental Tables, and the effects which these have produced on Modern Geographers in their Maps of Oriental Regions*; W. Macgillivray, *Account of the Series of Islands denominated the Outer Hebrides*: J. Bell, *On the Growing Power of Russia*. It is doubtful whether the *Journal* was continued beyond the third volume. In the second there is an account of the founding of the *Royal Geographical Society of London*, and it is interesting to observe that the men who, in Edinburgh, appear as the founders of the *Edinburgh Journal of Geographical Science*, re-appear among the original members of the new society.

## NEW BOOKS.

*The Civil Service Geography, being a Manual of Geography, General and Political.* By the late Lancelot M. Dalrymple Spence (of H. M. Civil Service). Completed and edited by Thomas Gray, C.B., one of the Assistant Secretaries of the Board of Trade. Tenth edition. London: Crosby, Lockwood and Son, 1890. Pp. 168. Maps. *Price* 2*s.* 6*d.*

"Marshal thy notions into a handsome method. One will carry twice as much weight trussed and packed up in bundles, than when it lies untoward, flapping and hanging about his shoulders." This quaint quotation from Fuller aptly describes the purpose and method of the little book to which it is prefixed. So much does it contain that surely the trussing and packing up must have been done by some psychic force passing the force of hydraulics, and we look on the livid purple boards with a feeling akin to that experienced at the sight of the gauge of a cylinder sustaining a pressure of 9000 lbs. on the square inch. The work has been well done; the information is accurate and piercingly precise. The revision is thorough, for—to take the most natural example—Ruwenzori stands placidly in its place, as if it had befogged the brains of civil service candidates since examinations were invented. But surely Mr. Stanley's claim for his discovery is disregarded by "Equatorial or Mountains of the Moon; these culminate in the peaks of Kilima-njaro (19,500 ft.) and Kenia (18,000 ft.)." Before the candidate loads up with his trusses of compressed geography he would do well to take heed to his foot-notes; for if, under "Brazil," "*Government*—a limited hereditary empire" is pitchforked up from the text, there would be some trouble in shifting the eight bundles which come after, when the *note* appears, and then in unpacking, fitting in a bloodless revolution and a republic, and binding up firmly once more.

In justice we must say that this book is in its way perfect; eminently practical and useful. But its way is not the way of the New Geography. Zanzibari porters on the march are said to "truss and pack up in bundles" their flapping raiment, and leave their bronze shoulders bare to carry their load. We have long affirmed, however, that Europeans should not carry their geographical knowledge packed so tightly nor their native ignorance displayed so prominently. Loads are always burdens, but the aim of education ought to be to cut and fit the burdensome facts into an easy and graceful garment for the mind, that will not be willingly laid aside except for a better.

*Advanced Physiography.* By John Thornton, M.A. London: Longmans, Green and Co., 1890. Pp. 342. *Price* 4*s.* 6*d.*

The author hastens to inform his readers in the preface that the subject with which he deals is "Advanced Physiography as defined by the syllabus of the Science and Art Department." This text is ably expounded, and no student, who follows the descriptions and examines the many admirable illustrations, should fail to pass an examination set by the South Kensington examiners. But we question whether, having done so, he will find himself much aided in grasping that unity in diversity of Nature without which no knowledge of detached facts, be they geographical or astronomical, is orderly or complete. Mr. Thornton gives an uncertain sound at the outset, which might well deter the prudent from preparing themselves for the battle of climbing into the citadel of Nature over the bastions of the syllabus. He says—"Whether Physiography be regarded as a separate science or not, it cannot be denied that, as thus set forth, it includes a fairly well-defined and well-ordered series of facts connected with the study of the universe. This is

quite as much as can be said of what is included in most of the other 'sciences.'" So much the worse for the "sciences"! We believe that physiography, being the whole of which "the sciences" are parts, is, when expounded by the laws of Nature, and not by the rules of the syllabus, the true gateway to the comprehension rather than to the knowledge of the universe.

Little in this really accurate and curiously comprehensive volume affects geography, but we note that the question of oceanic circulation is treated less adequately than some others, the all-important generalisations of Dr. Murray and Mr. Buchanan not being referred to.

*Geological Mechanism; or, an Epitome of the History of the Earth.* By J. Spottiswoode Wilson, C.E. Heywood: London. Pp. 138.

The author of this wonderful account of the mechanism of the earth has spent the greater part of a long life abroad, partly in Australia, partly in California, and partly in Ecuador. He has had many and varied opportunities of studying geological phenomena, and, had he given us an intelligible description of what he saw during his wanderings, he would doubtless have had an interesting tale to tell. Unfortunately he has chosen otherwise, and has instead delivered himself of a number of absurd imaginings and inane speculations, or, as he calls them, "new doctrines." This physical history is just the kind of history which might have been picked up by Alice in Wonderland. Let one sample suffice: "Our moon was once a comet with a very long nebulous tail, the appendage of comets generally, and having, when on its return towards the sun, come near the earth on one side and near the heat and more powerful attraction of the latter (their attractions were mutual in proportion to their respective masses), the moon curved round behind to the other side and passed off again at a tangent into a new orbit, and the earth, in place of the sun, became the centre round which the moon coursed, and they ever afterwards coursed round the sun in company. But the latter curving round the former, its tail came in contact with the more cold and dense atmosphere of the earth; and, going with a great velocity across the inert atmosphere, it received a rotary motion, and with it the mass of the earth, and this is the simple principle by which a boy makes a top to spin through the application of the whip. The comet tail of the moon was the scourge by which the earth was made to spin round its axis; but the atmosphere of the latter, being more dense, cold, and inert, arrested the tail and licked it off from the moon, which circumstance added vastly to the material borne by the atmosphere of the earth." This is only one of many other wonderful "theories" or "doctrines" with which Mr. Wilson has favoured this fortunate generation.

*The School Manual of Geology.* By J. Beete Jukes, M.A., F.R.S. Fifth Edition. Edited by A. J. Jukes-Browne, B.A., F.R.S. Edinburgh: Adam and Charles Black, 1890.

This book needs no detailed criticism; it is so well known that to say anything about it, beyond what is called for by the fact of a new edition being issued, would be merely a work of supererogation. The present edition is an improvement on its predecessors. Many parts have been re-written, and new matter has been added, partly by way of making the book more complete, and partly by way of illustration. The editor has done his work, as far as might be, in the well-known style of the original author. The general arrangement of the work remains the same, however. Some new illustrations have been added.

*A Popular Treatise on the Winds.* By WILLIAM FERREL, M.A., Ph.D. New York: John Wiley and Sons, 1889. Pp. 505.

The modesty of this title will, we fear, lead to some disappointment, for Professor Ferrel's work is not one to be taken up as a pastime. When a physicist warns his reader that he treats any matter in a non-mathematical manner the reader is usually safe in expecting a plentiful sprinkling of formulæ. Here there are several chapters that can be read without encountering an $x$ or a "sin," several in which these signs are confined in the safe limits of foot-notes, and the pages which are graced by their presence deal with phenomena of a kind that can be explained simply only in mathematical form. The mathematics are simple, however, and very slender attainments in algebra and trigonometry place the reader in possession of the alphabet in which the central laws of meteorology are laid down with a fulness and directness that both satisfies and gratifies a student.

Professor Ferrel is known as a theorist, and his *Treatise on the Winds* is a fine example of deductive reasoning applied to a subject in which the undue persistence of the inductive method had almost threatened to smother the science in a ceaseless snowfall of facts. Facts there are in plenty in the book; most of them, quite familiar as individuals, we have often met singly and passed in a crowd of their fellows, recognising no relationship between them. Here they are marshalled in imposing array; each is presented, not as a raw recruit of unknown character, nor as an uninteresting lounger in the barrack-yard of meteorological records, but as an integral part of an army in the field of scientific advance.

First, we are reminded of the constitution and nature of the atmosphere, then a chapter on the motions of bodies relative to the earth's surface prepares the way for a consideration of the general circulation of the atmosphere and of the climatic influences of the general circulation. More detailed chapters follow on monsoons and land and sea breezes. Most detailed of all is the discussion of cyclones and tornadoes, while a short chapter on thunderstorms brings up the close.

The most valuable of all the general laws is that which has for thirty years been associated with the name of Ferrel, and which explains a great number of facts in physical geography from the continual whirling about of winds and ocean currents to the relative slopes of the two banks of the Volga: "If a body moves in any direction on the earth's surface, there is a deflecting force arising from the earth's rotation, which deflects it to the right in the northern hemisphere, but to the left in the southern hemisphere."

The whole subject of atmospheric circulation on the large scale rests on this law of deflection, which modifies the difference between Polar and Equatorial temperature, is the source of movement, and is modified in turn by the configuration of the land surface. The importance of meteorology in geography is universally allowed; the zones of deserts, of steppe-lands and of forests, the distribution of plants and of animals, even the habitations and migrations of man himself are determined in a very large degree, or altogether, by climate. It is interesting to notice the large influence upon meteorology which Professor Ferrel assigns to geography. He views the steep faces of lofty table-lands, such as that of the east of Mexico, for example, as nearly as potent in determining the direction of prevailing surface winds as the coast lines of the Atlantic are in fixing the paths of ocean currents. Except Dr. Buchan's discussion and charting of the isobaric and isothermal lines of the globe for each month, in connection with the *Challenger* reports, no work comparable to Professor Ferrel's has been published in English on this most important branch of physical geography.

We note with regret the very poor character of the illustrations and, with amazement, the total absence of maps, which indeed makes the book all but useless to a reader who has not a physical atlas at hand.

*Dr. Kane, the Arctic Hero.* A Narrative of his Adventures and Explorations in the Polar Regions. By M. Jones. London: T. Nelson and Sons, Paternoster Row, 1890. Pp. 168.

A brief sketch of the facts of Dr. Kane's life is followed by an abstract of his *Arctic Explorations*, the book being apparently intended for young persons and older children. It is a respectable enough piece of book-making, apart from a certain carelessness of composition, which crops out far too frequently. Perhaps the worst instances occur on pp. 14, 16, 59, 147, and 165. Such words as "plop into the water," "sleepifying," "disentangleable," "cockering," to say the least of it, are not happy, and should not have been used. A redeeming feature is the sprightly "go" of the narrative.

*The Railways of Scotland: their Present Position. With a Glance at their Past and a Forecast of their Future.* By W. M. Acworth. With a Map of the Scottish Railway System. London: John Murray, 1890. Pp. viii. + 199.

This, as will be expected by those who know Mr. Acworth's companion volume on the railways of England, is no dry statistical compilation, but a valuable history of railway enterprise, progress, and development, told in a pleasant manner, and, although wonderfully detailed considering the size of the book, never dull. Scotland could not afford to build great lines all at once, but, with characteristic energy and caution, numerous small railways—local lines as they were generally called—appeared here and there, and continued to be managed and worked independently, or by some more powerful company, until by a continued process of amalgamation and absorption they were combined into the seven systems now in Scotland, which will, in all probability, soon be decreased in number. It is evident that in all these changes there must be matter of considerable value to many who have no sordid interest in our railways, no less than to shareholders and others connected with our great traffic lines, and most interesting the details are as presented by Mr. Acworth. Probably the past history of what is now known as the Caledonian Railway will be found most entertaining, but in the description of the Highland Railway there is cause for wonder, and many of the facts brought out concerning it must be new to most readers.

The forecast of the future of our railways seems to have been made with care and attention to all necessary details, special prominence being, of course, bestowed upon the Forth Bridge and the way in which it is likely to affect the interests of the whole railway system of Scotland.

*Illustrated Guide to Perthshire.* By Thomas Hunter. Perth: Robertson and Hunter. 1890. Pp. 234. *Price* 1s.

This is the sixth year of publication of this excellent guide. A good deal of new matter has been added, particularly a full description of the Forth Bridge route from Edinburgh to Perth. The account given of the Stirling district is also fresh and more detailed than in former editions. Altogether, Mr. Hunter has spared no trouble to make the book a real assistance to those who would desire a close acquaintance with the beautiful districts it describes.

*Russia's Railway Advance into Central Asia.* By George Dobson. London: W. H. Allen and Co., 1890. Pp. 439.

The author, writing from St. Petersburg in April 1890, states that this volume is the outcome of a journey from St. Petersburg to Samarcand in the spring of 1888, on the occasion of the opening of railway communication with the ancient

city of Tamerlane. It consists of fifteen chapters, eight of which appeared in *The Times*, the remaining seven being entirely new and bringing the account of the Transcaspian province down to the present date. The volume contains several excellent illustrations from photographs, and three interesting maps, showing that the railway from the Caspian to Samarcand is only the beginning of a line which may yet be extended to Omsk in Siberia and thence westwards, *viâ* Ufa, to Moscow. Were this projected line completed, "direct and uninterrupted railway communication would then be established with Moscow, and the cost and inconvenience of shipment and transhipment on the Caspian and the Volga, as well as the uncertainty of the wooden bridge across the Amu Daria, could be entirely avoided." General Annenkoff, the indefatigable constructor of the Central Asian Railway, states that that line is not only covering its working expenses, but already producing a surplus, which he calculates will represent, at the end of 1890, as much as 3 per cent. on the cost of construction.

Mr. Dobson's little work is full of interest to all following the progress of Russia in Central Asia. It also points out the close connection between railway communication and trade. Mr. Dobson emphasises the necessity of British merchants knowing something of the Asiatic people to whom they send their goods, and by way of illustration he tells the following story:—"A quantity of English shawls, turbans, and sashes, said to have been made in Glasgow, arrived in Bokhara from Peshawur, *viâ* Meshed, and could not be sold in spite of their very fine quality, while the Russian check turbans were all disposed of at very good prices. The secret was that the English shawls *bore a bird pattern*, which could not be worn by strict Mohammedans during prayers." Commercial geography may thus be held to include a knowledge of the idiosyncrasies of natives.

*Three Years in Western China.* By Alexander Hosie, H.B.M. Consular Service, China. London: George Philip and Son, 1890. Pp. xxxiv. + 290. *Price* 14*s*.

In this handsome volume Mr. Hosie gives an account of three important journeys undertaken by him from his official residence Chung-King on the Yang-tze River, the commercial metropolis of Western China, and elevated, on 31st March 1890, to the rank of a treaty port. Setting out from this centre, his journeys covered in all over 5000 miles. Mr. Hosie's first journey was in the spring of 1882. Proceeding due south from Chung-King, he visited a territory where, for the first time, he met with the white-wax insects, the rearing of which forms, along with that of the silkworm, a great Chinese industry. Mr. Hosie gives a detailed account of the production of the curious substance called "Chinese Insect White Wax," which, until the introduction of kerosene oil into China, furnished the chief means of lighting there. His second journey (February—July, 1883) was to the celebrated plain of Chengtu, the one large expanse of level ground in Western China, a plateau 1000 feet above the sea, containing an area of 2400 square miles, and about 3½ million inhabitants. It is one of the wealthiest and most densely populated districts in China, besides being eminently fertile and salubrious. The city of Chengtu is the finest in the empire. This journey was prolonged into various interesting districts, and lasted six months. Mr. Hosie's third journey occurred in the summer of 1884, and was mainly undertaken to collect information regarding the insect wax industry for the Royal Gardens at Kew. As Mr. Archibald Little, the Chinese traveller, says in his introduction to Mr. Hosie's narrative: "The result of those extensive explorations is an elaborate monograph on the province of Sze-chuen, such as has not yet been written of any

other of the eighteen provinces into which China proper is divided. It provides a mine of information for the traveller and the merchant, and appears at a most opportune moment, now that, by the establishment of Chung-King as a treaty port, this rich and interesting land is at last officially thrown open to Western enterprise."

The volume is beautifully illustrated, bound, and printed, and is accompanied by a large well-executed sketch-map of South-Western China to illustrate Mr. Hosie's journeys. It also contains exercises in the language of the Phö, the principal branch of the aborigines of the province of Kuli-chow, and an English-Phö vocabulary.

*Chronicle and Directory for China, Japan, Straits Settlements, Indo-China, Philippines, etc.*, 1890. Twenty-eighth annual issue. Hong-Kong: *Daily Press* Office. London: F. Algar, 11 and 12 Clement's Lane.

To any one having relatives or interests in the Far East this is a most entertaining volume. Its size has increased of late years in a manner which affords absolute proof of the growing prosperity of European concerns in the countries of which it treats. 277 pages are devoted to the names and occupations of Europeans. An accurate geographical and historical account of each settlement or colony, with plans of the principal towns, is given, and in some instances a Ladies' Directory adds much to the interest. It will surprise many to learn that Hong-Kong contains over three hundred European ladies.

A full copy of the Treaty of Tientsin (1858), the Chefoo Convention (1876), the various Orders in Council regulating the position of British subjects in China and Japan, and much information of a like character greatly enhances the value of the work. These treaties might be perused with advantage by those who seek accurate information regarding the various phases of the missionary question, and especially on the vexed subjects of opium and emigration.

*Geografia e Geologia dell' Africa.* Di T. Taramelli, Professore Ordinario di Geologia nella R. Università di Pavia, e V. Bellio, Prof. Ordinario di Geografia nella R. Università di Pavia. Con sette Carte. Ulrico Hoepli, Milano, 1890. Pp. 334. *Price* 12 *lire.*

The march of events in Africa is so rapid that a writer on the geography of that continent has to watch his opportunity very cleverly if he will avoid bringing out a book marred by omissions and lacunæ; the book may be quite up to date at the time of writing, and yet may have serious faults of omission on the day of its publication. The writers of the book before us have not escaped this danger. The important results of Stanley's last expedition were not at their command when they probably wrote the work; at all events none of them are alluded to. In another case mere inopportuneness of publication cannot be pleaded as their excuse. In treating of the Atlas Mountains they still keep up what Mr. Joseph Thomson affirms to be the false idea of an Anti-Atlas. The authors do not seem to have been aware of Mr. Thomson's trip to the Atlas and its results. Now, seeing that those results have been before the world since at least April 1889, ignorance of them cannot be set down as altogether venial, especially in the holders of chairs of geography and geology who are making a particular study of Africa. Comparing the orographic map in this book (Pl. 1.) with that figured in vol. iv. *Scot. Geog. Mag.* to illustrate Mr. Murray's paper on the Heights of Land, there is, on the whole, a general agreement, except in respect of two regions, that round the head waters of the Cunene, on the south-west of the continent, and the districts stretching

from the Nile and Bahr-el-Ghazal angle north-westwards towards the Atlas Mountains. In both cases the Italian map indicates in these regions a lower elevation. Whereas Mr. Bartholomew's map puts their elevation above 3000 feet, the Italian one makes it less than 3000 feet.

On the whole, the work is a fairly creditable compilation of the physical geography and geology of the Dark Continent; the information is well digested and conveniently arranged. The book is illustrated with maps and supplemented by appendices, bibliographical and others. The lists of writers on pp. 316-323 swarm with misprints; surely they cannot have been corrected when in proof!

*Reisbilder aus Liberia.* Resultate geographischer, naturwissenschaftlicher, und ethnographischer Untersuchungen während der Jahre 1879-1882 und 1886-1887. Von J. Büttikofer, Conservator am zoologischen Reichsmuseum in Leiden. Mit Karten, Lichtdruck, und Chromolithographischen Tafeln, nebst zahlreichen Textillustrationen. I. Band. Reise- und Charakter-Bilder. Leiden: E. J. Brill, 1890. Pp. xv. + 440.

This book is the outcome of a plan conceived by the late Dr. Hermann Schlegel, director of the Imperial Zoological Museum at Leyden. So long ago as 1879 Dr. Schlegel planned an expedition to the West Coast of Africa, for the purpose of gathering specimens for the museum under his charge; and he not only planned the expedition, but defrayed the costs himself—an eminent instance of public spirit and love of science in the head of a great national institution. The part of the West Coast of Africa chosen was Liberia, and the expedition was entrusted to Dr. Büttikofer, one of Dr. Schlegel's own assistants. This gentleman had for his companion C. F. Sala, a keen hunter and fisher, who, after spending several years as a soldier in Java, had been employed collecting zoological specimens in Portuguese West Africa. Unfortunately, Sala died of dysentery on 10th June 1881.

The present volume contains the narrative of Dr. Büttikofer's personal doings, except Chapters III. and IV., which treat respectively of the geographical relations of Liberia and of its flora. A second volume is promised, in which the author will discuss the people, the history of the republic, the soil, the social condition of the inhabitants, etc., and the animals that are found in Liberia. Dr. Büttikofer did not succeed in penetrating far inland, the furthest point being on the St. Paul's River, less than 80 miles from the coast. The narrative does not abound in exciting adventure or tell of great discoveries. But it gives the reader an excellent idea of every-day life amongst the uncivilised negroes just beyond the settled districts. The picture of these people is not a pleasant one; they are idle, thievish, deceptive, and extortionate. Now, this does not say much for the influence of the civilised negroes who constitute the republic of Liberia. The experiment which has been tried here, if not a failure, is certainly not a success. The tendencies towards retrogression are equal to those that make for progress, if not indeed stronger. The native population of the interior view with little respect or confidence the travesty of the white man's state which has been planted between them and the sea. The lack of enterprise in the Liberians is sufficiently proved by the fact that so little is known about the geography of the interior of the republic.

Dr. Büttikofer writes soberly, patiently, and carefully. His manner inspires confidence. He expends upon the narrative of his own doings the same conscientious thoroughness and love of detail, and the same precise accuracy, that he will bestow upon his technical work. And he does this in such a way as to retain the reader's attention and interest. The book can be safely recommended to those

who love honest work and know how to value it. There are a number of excellent illustrations, several from photographs; amongst others are fine views of Cape Palmas, groups of natives, bits of Monrovia, etc., and there is also a good, detailed map of the coast regions. On the last page of the book is figured the grave of Dr. Nachtigall, the celebrated traveller, who lies buried at Harper, near Cape Palmas.

*Travels in Africa during the Years* 1875-78. By Dr. Wilhelm Junker. Translated from the German by A. H. Keane, F.R.G.S. London: Chapman and Hall, 1890. Pp. 582. Map and Illustrations. *Price*, 21*s*.

Dr. Junker's travels in Africa are unsurpassed in those respects which are characteristic of the best German explorers: namely, accurate observation, which can only be expected from trained men, and the thorough and exhaustive treatment of details. These characteristics are specially traceable in his work where—as in the countries between the Nile and Congo catchment-basins—he broke new ground, and trod it with the assurance of an accomplished geographer, as well as of a competent observer. But, for some reason or other, this last journey of his is not dealt with in the present volume. The scientific results of Dr. Junker's travels have already been published in *Petermann's Mitteilungen*, and referred to in numerous "Notes" in our own magazine; we may, therefore, pass them over now with the remark that they worthily supplement the explorations of the discoverer of the Welle, of whom our author was, in a sense, the successor. Since the publication of Schweinfurth's *Through the Heart of Africa*, no more thorough and creditable itineraries of African travel have been offered to the public than those which Dr. Junker has given. Though the volume before us does not go into minute topographical details, sufficient is said to indicate the character of the countries traversed by Dr. Junker. It is deeply interesting throughout, and is written in a style which is as modest as it is attractive.

The translation is a good one. It is only the transliteration of a few of the place-names that we should feel disposed to criticise; moreover, inconsistencies in this respect are apparent, as well as obvious misprints.

The value of Dr. Junker's volume is greatly enhanced by numerous illustrations and a large map. But the illustrations differ greatly in character. Those that are reproduced from photographs and from drawings by R. Buchta are in the highest degree spirited and realistic. But others which reproduce drawings by L. H. Fischer are very conventional and tame; they do not add to the attractiveness of the book, and certainly not to its usefulness.

*Madagascar; or, Robert Drury's Journal, during fifteen years' captivity on that island.* Edited, with Introduction and Notes, by Captain Pasfield Oliver R.A., Author of *Madagascar*. Illustrated. London: T. Fisher Unwin. 1890. Pp. 397. *Price* 5*s*.

This romantic story was first published in London in 1729. The book was edited by Defoe. Coming from the hands of the author of *Robinson Crusoe*, the authenticity of Drury's story is open to considerable doubt. This is the opinion of Captain Oliver; "although," he says, "a basis of fact may probably underlie the various strata of fiction piled thereon." True or not, it is a very good story, although the perpetual recital of tribal wars among the natives becomes a little tiresome; but, as the author says, "it is something after all to read the real yarn of a man who, if not a pirate, had been uncommonly intimate with them who frequented the coasts of Madagascar in the eighteenth century."

*Canada: A Memorial Volume.* Edited and published by E. B. Biggar. Montreal, London: Edward Stanford, 1889. Maps and Illustrations.

The first part of this bulky volume is a reprint of the handbook on Canada recently published by the Dominion Government, and contains a general description of the country, together with an outline of its industrial, commercial, and political progress from the time of its discovery by Cartier in the reign of Francis I. of France down to the present day. The second part supplies multifarious information regarding each of the provinces and territories included in the Canadian Confederation. This information, being derived chiefly from official sources, may be regarded as authentic. The professed object of the publication is, mainly, to attract colonists.

The great want of Canada is inhabitants; for though it has an area forty times as great as that of the British islands, its population falls short of five millions. Until recently it received annually comparatively few settlers, a fact which the writer of the handbook ascribes to a long standing, and widely prevalent, prejudice against the climate. Canada was regarded as a region where winter reigned nearly all the year round, and where the cold was consequently of Arctic severity. The trappers and other agents of the old Hudson's Bay Company, who, like the Civil servants of the East India Company, had an inveterate dislike of interlopers, propagated this slanderous account of the climate as the best means of fencing their happy hunting-grounds against the intrusion of strangers. The narratives also of the navigators of the Polar Seas tended, though undesignedly, to confirm the prevalent impression that intensity of cold was one of the most striking characteristics of Canada. In point of fact, however, Canada has every variety of climate that is to be found in Europe from the Mediterranean to the Arctic Ocean. The marine currents are singularly favourable to Canada; for while the Gulf Stream exerts its benign influences along the littoral of the Atlantic, the Japanese current similarly influences that of the Pacific, insomuch that Vancouver's Island in the geniality of its climate resembles the south of England.

This vindication of the climate is followed by a brief but interesting historical sketch of the colonisation of Canada by the French, of its conquest by the English, and of its progress since that event. Newfoundland and Labrador were discovered as early as 1497 by the Cabots, who had sailed from England with a commission from Henry VII. to search for a north-west passage to the East Indies. Canada proper, however, was not discovered till 1534, when Cartier, a native of St. Malo, having landed on the promontory of Gaspe, which projects from the province of Quebec into the Gulf of St. Lawrence, took possession of the country in the name of his sovereign. Several expeditions were thereafter sent out successively from France for purposes of settlement, but all of them failed disastrously, and scarcely any progress was made till the beginning of the 17th century, when Samuel de Champlain, a man of singular energy, courage, and capacity, appeared upon the scene. In 1605 he took an active part in the founding of Port Royal (now Annapolis Royal) in Nova Scotia, which was then called La Cadie or Acadie, and three years later he himself founded the city of Quebec. He died in 1635, and had no successor of like spirit till Frontenac came as Governor in 1673, and revived the ardour for exploration and discovery, the greatest achievement in this direction having been the exploration of the Mississipi River and the Great West. The colony, however, grew very slowly as compared with the rapid advance of the English colonies in Virginia and New England. The settlers, in addition to the difficulties with which the pioneers of

civilisation in such regions had to cope, were incessantly harassed by the Iroquois and other Indian tribes, whose implacable enmity they had provoked both by perfidy and wanton aggression. The French, however, under Jesuit direction, took far more interest in the conversion of the savages than in the colonisation of the country. The wars also waged between England and France extended to their colonies, and the latter country lost by the war of the Spanish Succession Nova Scotia, Newfoundland, and Hudson's Bay, and finally Canada itself by the Seven Years' War, which was closed by the Treaty of Paris in 1763. The French King (Louis XV.), in signing away this splendid dependency, sought to minimise to himself and his people the sense of their loss by the remark, "It is after all only a few square miles of snow." The colony made rapid progress under the rule of its new masters, and in 1774 its territory was by Act of Parliament extended down the Ohio to the confluence of that river with the Mississippi and up the latter river to its source, but it finally receded to its present limits in 1783. Eight years afterwards it was divided into two sections, Upper and Lower Canada, each having a Legislature of its own. In course of time dissensions of great violence broke out between the two provinces, and continued till they were again (in 1841) united under one administration, with a full and effective recognition of the principle of responsible government, which had not till then been conceded. By the Act of Union the Executive Council or Cabinet which it created was presided over by the Governor-General, who held his appointment from the Crown; but the control of all public revenues was vested in the Legislative Assembly, which was popularly elected. At the time when this union was effected, the two provinces were nearly equal in population, and had, therefore, an equal representation in Parliament. Eventually, however, the Upper province far out-distanced the Lower in population, and demanded a re-adjustment of the representation to meet the change of circumstances. Party spirit on this question ran so high as to threaten a disruption of the union; but the difficulty was solved by an Act passed, in 1867, by the Imperial Parliament, which provided for the voluntary union of the whole of British North America into one legislative confederation under the name of the Dominion of Canada. The Dominion thus constituted consists of the two Canadas, Nova Scotia, New Brunswick, Prince Edward's Island, Manitoba, and British Columbia. The territories in the north-west also belong to the Dominion, and will be received into the confederacy when sufficiently advanced in population and organisation. Provision is made in the Act for the admission of Newfoundland.

At the time of the conquest the population of Canada was only 65,000. In 1806 it amounted to 445,899, in 1871 to 3,602,596, and in 1881 to 4,324,810. With regard to immigrant settlers, the number received in 1868 was 12,765, in 1879 it rose to 40,492, in 1884 to 103,824, but in 1885 it sank to 79,169.

An interesting section of the handbook is devoted to the subject of railways. At the time when the Confederation was formed the total length of the lines opened was 2380 miles, of which 905 miles were Grand Trunk. The Canadian Pacific has sincebeen added, extending from Quebec to Vancouver, a distance of 3053 miles, and therefore 218 miles shorter than the rival railway between New York and San Francisco. It is shown to be the shortest and best route from England to China, Australia, and New Zealand, and is therefore no doubt destined to be the future highway between Great Britain and most of her important colonies in the Pacific Ocean.

The second part of the work, in which each of the provinces is described, will prove very serviceable to emigrants looking forward to settle somewhere in Canada, as it points out the advantages and drawbacks the settler is likely

to find in each province. It closes with a section in which are shown the attractions, commercial development, and future prospects of a number of Canadian cities, towns, and villages selected by way of samples. The work is illustrated with eight maps and numerous woodcuts.

*Five Years at Panama.* By WOLFRED NELSON, M.D. New York: Belford Company. Pp. xiv + 287.

Dr. Nelson practised his profession at Panama from 1880 to 1885, and his residence there, together with a knowledge of Spanish and French, gave him ample facilities for becoming acquainted with the place and people. Since leaving the Isthmus, he has paid it several visits, and during his absence has endeavoured to keep himself well informed as to all that is going on. He gives us a tolerably good description of the country and its folk, and a lively account of his own experiences. As regards life in Panama and in the Isthmus generally, he is of opinion that "all depends upon the liver." A regular life, with simple meals and total abstinence from alcohol, enables one to make the best fight against disease. The Panama Canal comes in for a long and trenchant criticism, which, however, is rather dry. Dr. Nelson tells us that he is a correspondent of *The Montreal Gazette*, and this probably accounts for the too frequent display in his pages of that forced facetiousness and elaborate smartness that make so many articles in Transatlantic newspapers such irritating and melancholy reading. But, in spite of this little failing, the author may be congratulated on having produced an interesting and instructive book.

*Victorian Year-Book for* 1888-9 (Sixteenth Year of Issue). By HENRY HEYLIN HAYTER, C.M.G., Government Statist of Victoria. Two Volumes. Melbourne: Government Printing Office. London: Trübner and Co. Pp. 492.

These are simply volumes of elaborate statistics relating to the population, finance, interchange, and accumulation of the Colony. To any one specially interested in the country it is a mine of information, and for the general public there are many items of special interest. In consequence of delay in publication the latest date of most of the results is the end of 1888, though some notes in the appendices continue them to June 1889. One feature of the Reports must be greatly commended. In almost every department excellent comparative tables are given, showing the progress and condition of the Colony as compared with those of the other Australasian Colonies (including New Zealand and Tasmania), as well as of Great Britain and its other dependencies and of all important foreign states.

The last census of Victoria was in 1881, but the estimated population of the Colony to June 1889 was 1,104,288. The estimated population of Melbourne was 419,490, an increase of 50 per cent. since 1881. It now ranks after London, Glasgow, Liverpool, Manchester, and Birmingham. From a curious table of density of population in various towns we take the following:—Paris 121 persons to the acre, Glasgow 85, London 53, Edinburgh 43. Melbourne is given only in districts, such as Fitzroy 37, Melbourne City 23, South Melbourne 22, etc.

Victoria is the only Australasian Colony that can boast of a surplus revenue, the income being £7,607,598, or £7, 0s. 7d. per head of population, and the expenditure £7,287,151. Public debt, £37,627,382, or £34, 1s. 6d. per head; about £32,000,000 of this is apparently spent on such remunerative works as railways, water supply, roads, harbours, etc. The money spent on public works in 1888 was £3,384,888. The exports of 1888 were £13,853,763, of which the chief items were—gold, £3,523,642; wool, £5,171,000; bread stuffs, £938,000; live stock, £406,000. The imports were £23,792,134. As an index of the extension of commerce it may be remarked that, in the last eight years, the population of the Colony has increased by 27 per cent., and the shipping tonnage by no less than 98 per cent.

There are some interesting features in the postal returns. It has been the policy of the government to work the postal and telegraphic services irrespective of loss, and consequently the reports show a considerable deficit, the revenue being £545,000 and the expenditure £557,302. New Zealand is the only Australasian colony of which the postal income meets the expenditure, so that we cannot wonder if Mr. Goschen's proposed reduction should require, on the part of the colonies, very anxious consideration. More letters per head of population were received and despatched, in 1884-5, in Australasia than in any other part of the world. The number was slightly higher than in Great Britain, and twice as high as in any other country except Switzerland. New Zealand took the lead.

Free education was introduced into Victoria on 1st January 1873, and since that time the expenditure has been £9,500,000. The cost for 1887-8 was £697,715.

Wages in the colony run thus—Domestic servants, £30 to £70 a year, with board and lodging; masons and carpenters, 10s. to 11s. per day; blacksmiths, 10s. to 14s. a day. Provisions, on the other hand, are cheap: bread not quite so dear as in this country; tea only 6d. to 1s. 11d. per lb.; and butcher's meat very cheap, mutton being only 1½d. to 3d. per lb.

The second volume contains vital statistics and tables showing the production, crime, social condition, etc. of the colonies. The death-rate compares favourably with those of European countries; the lowest mean, for the years 1865-1888 inclusive, being that of New Zealand (11·80 per thousand of population), while the highest (Queensland) is only 17·78. The mean annual increase of population, due to excess of births over deaths, is, as might be expected, large compared with European countries. The mean for the years 1876-1885 was highest in New Zealand (2·78 per cent.), and lowest in Victoria (1·66). In 1887, Australasia produced 462,051,230 lbs. of wool, or about one-fourth of the total production of the world. There has been a gradual fall in price from 12⅝d. in 1884 to 10¼d. in 1888. The area under cultivation has gradually increased, and in 1888 amounted to 1,465,319 acres. Taking Victoria alone, we find a slight diminution in the area under cultivation, and a considerable one in the yield per acre of the principal crops. Between one-third and one-fourth of the total production of gold is raised in Australasia, the weight of gold extracted in 1887 having been 1,434,822 oz. A great deal of information is also given concerning the tenure of land, education, and many other subjects, and the principal statistics are collected in sheets at the end of the volume.

*The Cruise of H.M.S. "Calliope," in China, Australian, and East African Waters*, 1887-1890. By the Rev. A. C. Evans, M.A., Chaplain R.N. 1890. Griffin and Co., Portsmouth. *Price* 2*s*.

In the preface the author states that this record of the cruise of the *Calliope* was "hurriedly thrown together, in response to a wish expressed by several of the ship's company." It is given in the form of a diary, and we think that any one who reads it will feel disappointed that, with such a variety of material, the author did not produce a larger book. Some of the descriptions of places and events are too much condensed. Of course the most striking event is the hurricane at Apia, when the *Calliope* escaped destruction by steaming out in the teeth of the gale, passing close to the American flagship, where they saw "400 men standing face to face with death," from whom "broke forth a ringing Yankee cheer, to speed the plucky Englishman on his way."

At page 82 it is mentioned that during the hurricane the glass fell to 29.11. This is surely a misprint. 29.11 does not seem very low for a hurricane. On the last page Admiral Latnall should be Admiral Tatnall.

# NEW MAPS.

## ASIA.

**WESTLICHEN KLEINASIEN,** Specialkarte vom ——, nach seinen eigenen Reisen und anderen, grösstentheils noch unveröffentlichten Routenaufnahmen, bearbeitet von Heinrich Kiepert. Massstab, 1 : 250,000.

*Sheets* 1, 2, 7, 10, *and* 14. *Berlin : Dietrich Reimer*, 1890.

The first part of this new map of Western Asia Minor, by Professor Kiepert, which was looked forward to with such great expectation, has been published. Everybody interested in the geography and history of this home of ancient civilisation will receive the news of this most important publication with great satisfaction. The two other parts are promised by the author and publisher before the close of the present year. The map has its history. Almost half-a-century has passed since Prof. Kiepert published his first general map of Asia Minor, on the scale 1 : 1,000,000. He used for this map not only the material collected on his own journeys with Prof. Schönborn, but also the map of Count von Moltke, which that famous Prussian officer placed at the disposal of the author after his return from Turkey. This map, though long out of date, has until now been the only one published of the country. Our welcome and appreciation of this new work, on a much larger scale, is all the warmer. The first issue contains five sheets—Gallipoli, Constantinople, Smyrna, Samos, and Rhodes, and thus includes almost the whole country from the Bosporus down to Pydna, bordering on the Archipelago. The coast-lines are reduced from the works of British naval officers under the direction of Captains Copeland, Graves, and Spratt ; those of the Sea of Marmara from the surveys of Capt. Wharton, 1872-80. In 1870, 1886, and 1888, Prof. Kiepert revisited the country. The routes marked in vermilion show the importance of these itineraries in the construction of the map. His route in Lydia, in 1888, is continued by that of Fabricius, now Professor in the University of Freiburg ; and the value of the researches of the members of the Austrian expedition to Lycia, in 1882-83—Messrs. Benndorf, Niemann, Petersen, and von Luschan, are similarly recognised. These data were placed at the disposal of Prof. Kiepert for the construction of a map of the southern borderlands, and have been used almost without additions. He has further made use of the surveys of W. von Diest's expedition, despatched by the German Archæological Institute to the environs of Pergamos, which penetrated into the central plateau. Dr. C. Humann's general route-map of the territory watered by the tributaries of the Cayster and Mæander rivers, and several special surveys made for the projected English continuation of the Smyrna-Cassaba railroad, by Mr. Purser and M. Möllhausen, have also been brought into requisition. The results of four years' journeys of Mr. Ramsay, now professor in the University of Aberdeen, and of his companions, Messrs. Cherrett and A. Smith, across the plateau of ancient Phrygia from Eskishehir to the border-mountains of Lycia, were kindly placed in the hands of Prof. Kiepert. A map containing the southern districts of the Sea of Marmara, as far as Balikessri, by the mining engineers Desmazures and Groppler, in 1 : 100,000, and a map of the forests of Troy by E. Godchaux, 1 : 120,000, were of great service to the author. The Sections I. and II., the Chersonese or Peninsula of Gallipoli and the environs of Constantinople, are based on the surveys of *genie* officers of the French army executed on the way to the Crimea (1854), on the scale 1 : 50,000, and on the surveys of Russian officers during the war in 1878, on the scale 1: 210,000. The heights, which are given in mètres, have been transferred, so far as the islands and mountains near the coasts are concerned, from the British Admiralty Chart. Other

figures further inland, from the same source, are marked "S. Ch." (Sea Chart). The figures in the interior are derived from the barometrical observations of various travellers, and, since they exhibit considerable divergence, Prof. Kiepert has added to each the initial of the observer. The figures in brackets are communicated by Prof. Ramsay. The heights on the European part of the map are taken from the Russian Survey. The large number of documents consulted, of which we have been able to mention only the most important, shows the great care which Prof. Kiepert has taken to bring the map up to date, and to give as much detail as possible. An explanatory note on the map, in German, French, and English, distinguishes railways, roads, ancient and mediæval ruins, watch-towers, ancient names, Christian convents, churches and chapels, cemeteries of abandoned Turkish villages, and uncertain positions of villages, copied from Turkish and Greek sketch maps. The letterpress which accompanies the first part deals with the construction of the map, with a minute account of the data employed, and with orthographical, statistical, and hypsometrical questions. We must congratulate both author and publisher on having accomplished such an important and costly work, which should have been taken up by the governments of the states interested in Asia Minor, and not left to private enterprise.

## AFRICA.

**AFRIKA**, in 6 Blättern, von Dr. R. Lüddecke, im Massstab 1 : 10,000,000. Mit einem Namensverzeichniss enthaltend 16,000 Namen mit Hinweis, wo dieselben auf der Karte zu finden sind. *Price* 10*s*. *Gotha : Justus Perthes.*

In the new edition of Stieler's well-known Hand-Atlas, the three old sheets of Africa are replaced by a six-sheet map on the scale 1 : 10,000,000, or 157·8 miles to an inch. These sheets have been joined into one map and mounted on cloth in a cover, with a copious index containing 16,000 names. A great many maps of Africa, good and indifferent, have been published, but none can bear comparison with this of Dr. R. Lüddecke. It is without doubt the best map published up to the present time. It may be called a reduction of Habenicht's large map of Africa (1 : 4,000,000), but the care which the author has taken to bring his map up to date, and the large amount of new material employed are noticeable at a glance. Eighteen sectional maps are given on larger scales than the general map. Those of South Africa, Senegambia, the Lower Congo, the Gold Coast, Zanzibar, Abyssinia, and the Strait of Bab-el-Mandeb, are constructed on the scale 1 : 5,000,000 ; Lower Egypt in 1 : 2,500,000 ; Cameroons in 1 : 1,250,000 ; Dakar, Gorée, and the Suez Canal in 1 : 1,000,000 ; Cape Town and its environs in 1 : 500,000 ; Perim Island in 1 : 250,000 ; Alexandria and its environs, Cairo and its environs, in 1 : 150,000 ; the Pyramids of Gizeh in 1 : 50,000. The author has made in his drawing a distinction between regions more or less well explored by European travellers and those known only by the reports of natives. Countries such as Algeria, Egypt, Cape Colony, Orange Free State, and the Transvaal, are treated as surveyed or well mapped. Lettering engraved in hair-line, courses of rivers marked in dots, and hills broken and sketchy are indications that the knowledge of the territories delineated is imperfect.

## AMERICA.

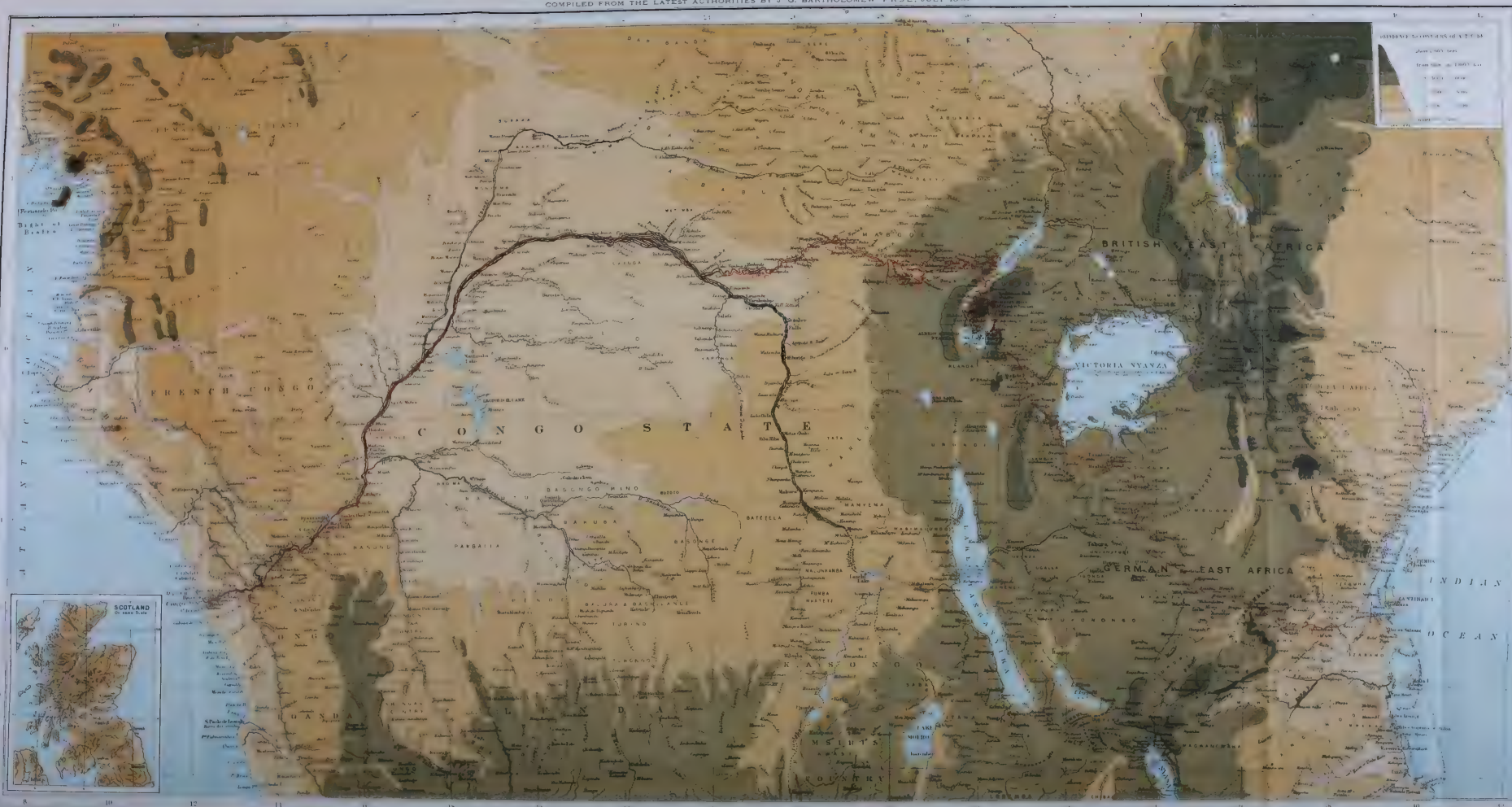
**CANADA**, The Pocket Atlas and Gazetteer of the Dominion of ——. By J. G. Bartholomew, F.R.S.L., F.R.G.S., etc. Edited by J. M. Harper, M.A., Ph.D., Quebec. *London : John Walker and Co.*, 1890.

This is another of the handy little atlases drawn by Messrs. Bartholomew. The present volume contains a gazetteer, with which an index to the map is combined.

# OROGRAPHICAL MAP OF EQUATORIAL AFRICA.

SHOWING THE ROUTE OF Mr STANLEY'S EMIN PASHA RELIEF EXPEDITION, 1887-89.

COMPILED FROM THE LATEST AUTHORITIES BY J. G. BARTHOLOMEW F.R.S.E. JULY 1890




Mr STANLEY'S ROUTE SHOWN THUS ——

Scale 1:5,000,000
English Miles

THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

# THE MALTESE ISLANDS, WITH SPECIAL REFERENCE TO THEIR GEOLOGICAL STRUCTURE.

*(With Geological Map, two Lithographic Plates, and Woodcuts.)*

By John Murray, LL.D., Ph.D., etc.

*Of the "Challenger" Expedition.*

When, in the year 1530, the Emperor Charles v. of Germany handed over the sovereignty of the Maltese Islands to the Grand Master of the Knights of St. John of Jerusalem, a commission was despatched by L'Isle Adam to examine and report on the new possession. The report is said to have been to the following effect :—

"That Malta, about sixty miles in circuit, was but an arid rock, covered in many places with sand, and in a few with a light scattering of earth brought from the neighbouring continent, or from Sicily ; that it had neither river, nor rivulet, nor spring, nor any other fresh water for the most part, save rain preserved in tanks or cisterns, except a few wells, rather brackish ; that it produced a little corn, not half enough of anything to feed the scanty population ; that it would be a very unpleasant residence, particularly during summer ; violently, nearly intolerably hot, with not one forest tree, hardly a green thing to repose the eye upon ; and a sort of ill-walled town, called its capital, in the middle of the island, at a considerable distance from the sea ; that, however, the stone is not hard, but rather *tufo*, or soft, and easy to cut into any shape ; that the people speak a dialect of Arabic or Moorish, and are noted for their frugality of living ; that, for the rest, the harbours may be rendered good, and that what are termed *casali* are miserable villages or shocking huts, rather befitting fishermen and pirates than the renowned Hospitallers ; that as to Gozo it was too little, though, in comparison of Malta, fertile and pleasant."

Seddall,[1] after quoting the above condensed report from the writings of Lieut.-Col. Porter, says :—"This description of the islands and their inhabitants holds good in nearly every particular even in the present day." While the islands are said by this writer to be interesting from their association with great events in ancient and modern history, they are represented as presenting few attractions beyond the walls of Valetta ;

[1] *Malta : Past and Present.* By Rev. Henry Seddall, p. 40 ; London, 1870.

the only scenery is burning rocks of white limestone and dusty roads flanked with stone walls—not a tree to shelter, not a blade of grass to cheer the eye. The tourist who alights from passing steamers to spend a few hours or days in the city of palaces and stairs, sees little of remoter parts of the islands, and on continuing his voyage usually repeats :—

> "Adieu, ye joys of La Valette !
> Adieu, Sirocco, sun, and sweat !
> Adieu, thou palace rarely enter'd !
> Adieu, ye mansions where—I 've ventured !
> Adieu, ye cursed streets of stairs !
> (How surely he who mounts you swears).
> . . . . .
> I 'll not offend with words uncivil
> And wish thee rudely at the Devil ;
> But only stare from out my casement,
> And ask, for what is such a place meant ? "[1]

These adverse views of the islands are not, however, shared by the native Maltese, who regard themselves as descendants of the ancient Phœnicians. For them there is no place on earth more beautiful, more fertile, more to be desired than the islands that gave them birth. In ardent and patriotic language Malta is referred to as the "flower of the world."[2] The native of Malta is as attached to this so-called barren rock as the Irishman to the "green isle," or the Scotsman to "Caledonia stern and wild." It is an effort for him to leave his island home ; when abroad he ever desires to return, and this he almost invariably does when he has accumulated a competence or is overtaken by misfortune.

After climbing nearly every hill-top, visiting nearly every ravine, sailing under the magnificent sea-cliffs, and enjoying the splendid climate of Malta and Gozo, one is inclined to share the enthusiasm of the natives rather than acquiesce in the unfavourable opinion of so many travellers ; the Maltese Islands are possessed of much natural beauty, and are full of interest for the geologist, naturalist, archæologist, philologist, historian, political economist, and politician.

In this paper I propose to give the results of some observations and investigations carried on, at intervals, during the past two or three years, with reference principally to the petrographical characters and composition of the rocks of Malta, and thereafter to point out the conditions under which these rocks were in all probability laid down on the floor of the ocean. It will appear from these researches that the Maltese Islands, far from being barren rocks, are probably among the most fertile, as well as the most populous, lands of the globe. Before dealing with the geology of the islands, it is desirable to state the principal facts concerning their geographical position, climate, and past history.

Geographical Position.—The Maltese Islands are situated near the centre of the Mediterranean, about 60 miles directly south of Sicily, on the banks which connect Sicily with the African continent, and divide the Mediterranean into two deep hydrographical basins, an eastern and a

[1] Byron, "Farewell to Malta."

[2] *Fior del Mondo.*

western basin, in each of which there are depths exceeding 2000 fathoms. The banks between the west end of Sicily and Tunis are in no part covered by more than 200 fathoms of water, and between the east end of Sicily and Tripoli the depths do not exceed 300 fathoms, while the greater part of the area of these banks has a much less depth, the Maltese group being placed on the southern edge of an extensive bank with an average depth of less than 50 fathoms. The other islands situated on, or in close proximity to, these banks are Lampion and Lampedusa, near the African shores, and the volcanic islands of Pantellaria and Limosa, towards the centre of the channel. The famous Graham volcano, which was an island for a few weeks, and was actually taken possession of by the British, but has now been reduced by the waves to the condition of a shoal, was situated to the north-west of the Maltese group, as will be seen by reference to the accompanying bathymetrical map. This map also shows that an elevation of a little over 50 fathoms would connect Malta with Sicily and Italy, and that an elevation of a little over 200 fathoms would connect Europe with Africa in the neighbourhood of these banks. An elevation of 200 fathoms would also connect Europe with Africa at the Straits of Gibraltar, and cut off the Atlantic from the Mediterranean, for the depth of water at the straits is about the same as on the bank connecting Sicily and Tunis.

These islands are situated in a region where evaporation much exceeds precipitation, hence the specific gravity of the surrounding sea-water is 1·0300, which is much higher than that of the Atlantic, or of any waters in the open oceans. The temperature of the surface-water in this part of the Mediterranean sometimes reaches 90° F.; the mean temperature of the first 200 fathoms off Pantellaria was found by H.M.S. *Shearwater* to be 66°·7 F. The temperature of the bottom-water in the western basin of the Mediterranean is about 54°·5 F., and in the eastern basin 56°·0 F., these temperatures being fully 20° higher than the temperature of the bottom-water in the Atlantic at corresponding depths. This large body of warm water in the deeper parts of the Mediterranean greatly influences the climates of the coasts, and especially of the smaller islands like Malta.

Extent and General Appearance.—The group consists of two principal islands, Malta and Gozo. Midway between these are the small islands of Comino and Cominotto with several small rocklets, and off the south-west of Malta the rocklet named Filfla or Filfola.

The direction of the long axis of the islands, which, with the intervening channels, is 29 miles in length, is NW. to SE. Malta is 17·5 miles in length, 8·33 miles in breadth, and has an area of 95 square miles. Gozo is 9 miles in length, 4·5 miles in breadth, and has an area of 20 square miles; Comino is 1·2 miles in length, 1 in breadth, and has an area of about 1 square mile. The width of the channel between Malta and Gozo is about 3 miles. The highest points of the two main islands are about the same elevation, viz. 758 and 743 feet above sea-level. In Malta the cliffs on the west and south rise sheer from the sea to a height of 300 and 400 feet; to the north the land shelves to the water's-edge in many places,

and on this side there are large bays and excellent harbours for all classes of shipping. At Valetta and St. Paul's Bay, where the Apostle Paul was wrecked,[1] however, there are some high cliffs. The hills, especially in Gozo, have generally the appearance of a truncated cone, due to the structure of the geological strata, as will be subsequently pointed out.

The general appearance of the islands is bare, owing to the want of trees and the immense number of stone walls that enclose the fertile fields. These high stone walls give an aspect of sameness, and the reflection of the sun's rays from their reddish or white surfaces becomes after a time very irksome. Viewed, however, from some of the higher hills of Malta and Gozo, the land appears green, fresh, and fertile, especially in the spring, as the walls do not from such a position conceal the growing crops.

Climate.—The mean January temperature in Malta is 54°·5 F.; the mean temperature of the three winter months (December, January, February) is 56°·0 F.; the rainfall for the same months is 17·5 inches, and during this time there are frequently hail-storms, but no snow.[2] The mean annual temperature is 67°·3 F., and the annual rainfall 24·23 inches. During the eight cool months the thermometer only on rare occasions falls below 50°, and does not rise above 71° or 72°. In summer the heat is almost tropical, the temperature ranging between 75° and 90° F., and there is little or no rain. For three successive years—from 1467 to 1470—no rain is said to have fallen at Malta, and the islands suffered greatly from drought. In 1852 only 8·27 inches fell, and in 1866 only 10·49 inches are recorded.

The northerly wind is bracing, and sometimes approaches the force of a gale.[3] In February 1889 this wind was so cold that in driving it was necessary to wear heavy fur coats and jackets, and at times the wind was accompanied with such heavy falls of hail that the ground became quite white for an hour or two. The south-west wind—the Sirocco from the African deserts—is very enervating; though this is a dry wind in Africa, it is, in Malta, charged with vapour, and while it is blowing the pavements of the streets are wet and everything feels damp. There are no rivers nor marshes on the islands, but during heavy rains the valleys are filled with torrents. Springs are found at the junction of the upper limestone with the underlying beds of clay and marl. The rain is speedily absorbed by the porous rocks. Earthquakes are relatively frequent, and coincident with disturbances in the Eastern Archipelago.[4]

Botany and Zoology.—The flora is almost identical with that of Sicily, nearly every Maltese species being also found in that island. It is less extensive, but this is due to the total absence of rivers, mountains, marshes, and lakes, to the exposure to maritime influence, to the preva-

[1] Acts of the Apostles, chap. xxviii.

[2] Fischer, *Studien über das Klima der Mittelmeerländer.*

[3] "Gregale," or Euroklydon. Acts xxvii. 14.

[4] At Foum el Rich Bay ancient cart-ruts terminate abruptly on the cliff edge, showing conclusively that large portions have fallen away in recent times. Similar cart-ruts and artificial rock-caldrons are beneath water at Marsa Scirroco, and indicate, along with other circumstances, a recent submergence of the islands.

lence of strong winds, and to the spare rainfall—insignificant from June to August. Professor Gulia enumerates upwards of 900 species, representing 84 natural orders. The only peculiar forms are:—*Centaurea spathulata* (Zerafa), from Wied Babu and Gozo; *Atriplex gussoniana* (Gulia), from Marsa Scala; *Cynomorium coccineum* (L.), from Gebla tal General and caves in the cliffs under Casal Dingli, parasitic on the roots of *Inula crythmoides*; *Parietaria diffusa*, var. *populifolia* (Nyman), from Guina. Mr. A. Caruana Gatto states the following as the general differential characters of the Maltese flora:—(1) A marked want of trees and shrubs, there being only nine sub-spontaneous trees and less than thirty shrubs; (2) a small number of vascular plants; (3) a strong predominance of annuals; (4) few species in proportion to genera, being nearly two to one; (5) a great preponderance of *Leguminosæ Compositæ* and *Graminæ*, these making up by themselves more than one-third of the flora; (6) a maximum of vegetation in March and April, a minimum in July and August; (7) an unequal distribution of species over the islands, many species being restricted to peculiar areas.

In the spring-time the numerous indigenous plants give an appearance of great wealth and beauty to some of the valleys of Malta and Gozo. The flowers of Malta have indeed long been celebrated, and Gozo and Malta have still a great reputation for excellent honey. In many of the rocky ravines and bare dry plains and plateaux, a few dry karubu trees, prickly pears, vines, figs, oranges, and pomegranates, alone dot the landscape, but in some of the small well-watered ravines of the south coast there are many trees and a grateful shade.

The indigenous mammalia of Malta belong to well-known European species:—the rabbit, weasel, hedgehog, Norway rat, species of mice, and bats. The famous Maltese dog appears to be nearly, if not quite, extinct. Among domesticated animals, goats are abundant, and supply the inhabitants with milk; the udders are enormously developed, frequently trailing on the ground. The sheep also give milk, and have much the appearance of goats. Mules, asses, and cows are used in the fields; the cattle do not give much milk, are all fawn-coloured, and have tall, gaunt, lanky bodies. The horses of Malta are small and have been much improved in late years. The mules and donkeys belong to a good breed.

A great many birds visit Malta for a few hours or days in their passage across the Mediterranean in the spring and autumn months, usually arriving and leaving at night; some species, however, remain a few months and breed *en route* to Europe. In certain years some species, rarely seen at Malta, arrive in great numbers. Only seven species are resident all the year round. *Thalassidroma melitensis* (Schembri), is a local variety of *Th. pelagica* (L.), restricted to the islet of Filfla, where it breeds.

Turtles are often taken by the fishermen around the islands; there is a land tortoise, several lizards, harmless snakes, and frogs. St. Paul, according to native tradition, banished venomous snakes from Malta, as St. Patrick did from Ireland. The lizards on the islet of Filfla are a beautiful brown black colour—thus different from those on the mainland. There are numerous species of land and fresh-water shells, fourteen of which are peculiar to the islands, two species of terrestrial Isopods, many

insects and Arachnids. The seas abound in fish and all the usual marine plants and animals of the Mediterranean.[1]

Soils and Agriculture.—We shall see later on that the whole of the soil of Malta is derived from the disintegration of the subjacent rocks. The natives have with great industry collected this residue of the rocks from cracks, crevices, and pot holes, to spread on their fields. There seems to be no foundation for the widespread belief that soil was imported into the islands in past times. The soils of Malta are all in accordance with the strata on which they rest. On the upper coralline limestone is red clayey soil; on the outcrop of the stiff yellow and blue clays, sometimes mixed with detritus from the yellow sand, it is blue or grey; on the upper series of the Globigerina limestone there is a whitish marly soil; and on the "Franca" again, red soil. The lower coralline limestone is likewise covered with a red soil in the few places where exposed on the surface.

With reference to this subject, Mr. Osbert Chadwick has furnished me with the following notes:—

"The theory of importation does not, to my mind, appear to be probable. It may be that some Grand Master imported some ship-loads of soil, though no difference is to be observed between any of the lands of the Order and others in the neighbourhood.

"If we suppose that out of the 95 square miles which form the area of Malta, not more than 10 are covered with red soil to a depth of 1′ 6″, then we have $\frac{10 \times 3097600}{2} = 15{,}488{,}000$ cubic yards; at 200 cubic yards to a ship-load this gives 77,440 ship-loads, or one ship a day for two centuries, all of which must have loaded at or near the same place, such as Marsala, where I observe that a similar soil overlies an apparently similar geological formation. The assumed 10 square miles is a guess only, but the figures give an idea of the magnitude of the operation. I am not acquainted with the documentary evidence as to importation of soil, but it must indeed be strong to be accepted. I have observed that the Maltese, like most meridionals, have a strong tendency to adopt the most heroic and marvellous solution of any given problem.

"Roman puzzolana, still imported in considerable quantities, has almost certainly been mistaken for earth. It is still much used in Malta for imparting hydraulic qualities to the fat lime of the country. I have used it largely myself. It is, apparently, a clay calcined by the juxtaposition of lava, and is of a chocolate red colour, much resembling the red soil. As fragments of puzzolana are to be seen imbedded in mortar of all ages, it is well that attention should be drawn to the circumstance to prevent the deception of future observers. At the same time, it is quite true that the greater part of the cultivable soil has been prepared artificially, and that in many cases it has been collected and carted to considerable distances. At the present day surplus vegetable soil from any building site, road scrapings, and the like, are removed to cover and reclaim barren tracts of rock."

[1] See papers by C. Wright, W. Grant, W. C. P. Medlicot, Dr. G. Gulia, Dr. A. L. Adams, T. Davidson, Marquis of St. George, and others.

All the soils contain a large quantity of carbonate of lime; in many instances I have found over ninety per cent., the soil being then little more than the broken-down particles of the underlying rocks. It is the boast of the inhabitants that not a spot capable of cultivation is uncultivated. In the high grounds every field is a terrace, a level surface with a thin covering of soil enclosed by stone walls, and probably nowhere in the world has skill and industry been better exemplified than in the cultivated lands of Malta. There are still, however, large areas which are unoccupied and capable of being reclaimed and covered with soil. The soil though thin is very fertile, from the presence of phosphates and alkalies in the underlying rocks, and is never allowed to rest, yielding two and three crops in the year. Cotton was at one time largely grown for export, but now only for home consumption. Large quantities of early potatoes are grown for the English market, and barley, wheat, maize, clover, peas, beans, onions, melons, cummin, grapes, oranges, figs, and other fruits and vegetables are produced for export or home use. The farm implements are of the most primitive description; the plough is light and single-handed, and can be carried on a man's back. There is no tax on land, and the farmer is free from tithe and poor-rate, there being no direct taxes or rates of any kind in the islands. There is, however, an import tax of 10s. per quarter on corn, and when some years ago there was a suggestion to remove this bread-tax, the people opposed the proposal;—at the present time bread is said to be cheaper here than at any other Mediterranean port. One-third of the land belongs to the Romish Church, one-third to the Government, and the remaining third to private individuals. The average rental for good productive fields is at present about £2, 10s. per acre, and £1, 10s. for medium productive fields. The agricultural produce at the present time would only supply about four months' food for the existing population.

History.—From its central geographical position in the Mediterranean,—midway between Europe and Africa, between the Pillars of Hercules and the Syrian coasts of Asia,—as well as from the fertility of its soil and the excellence of its harbours, Malta has, from the earliest times, been a place of great importance for all the maritime peoples of these regions, and at the present time is the principal British naval station outside of England, and one of the best fortified strongholds of the British empire. If we except some interesting but rather doubtful indications, a careful search in the fossiliferous caverns and caves of these islands has not as yet revealed any traces of prehistoric man, and none of the human monuments have with certainty been ascertained to belong to a historical period prior to the Phœnicians.[1]

Malta is believed to be the Hyperia[2] of Homer—the home of the Phæacians, a race of giants, while Gozo has been identified with the Ogygian Isle, where Ulysses took refuge, and tradition still points out the grottoes

[1] Davy, *Ionian Islands and Malta*, p. 112, London, 1842: Leith Adams, *Nile Valley and Malta*, p. 195, Edinburgh, 1870.

[2] *Odyss.* lib. 6.

of Calypso. Old historians and geographers agree in admitting that the islands were once the home of a race of giants, and this opinion was supported by later writers consequent on the discovery of huge mammalian ribs, bones, and teeth in the quaternary deposits, as well as on the presence of the still existing megalithic monuments.

The earliest inhabitants of whom there are any authentic traces are the Phœnicians; they are believed to have formed settlements in Malta 1500 years before Christ, and the "Eigantea" or Giant's Tower of Gozo, "Hagiar Kim" and "Mnaidra" in Malta, have been shown to be remains of their temples, while other rough stone monuments, pottery, glass vessels, sculptures, inscriptions, and rock-cut tombs equally remain to the present day as probably the best preserved and authenticated relics of this Semitic people—the greatest maritime race of antiquity. The present language of the Maltese is, indeed, a dialect of the Arabic, with many words adopted from the languages of other Mediterranean peoples, and it is stated to exhibit a great analogy with Chaldean, Hebrew, and Phœnician; it is, however, an unwritten tongue, without a literature or an alphabet. A Greek colony, probably from Syracuse, is said to have formed settlements in the central and elevated sites of the island about 700 years before Christ, living peacefully with the Phœnicians, who occupied the sea-shore. The sarcophagi of terra-cotta and other Egyptian remains were probably introduced by the Phœnicians, for it is well known that the Egyptians hated the sea, and that their vessels were usually manned by Phœnician sailors. Caruana has pointed out the great riches of the islands in Greek, Carthaginian, and Roman antiquities, as well as Phœnician, and has shown how these indicate a great prosperity in these islands in Pagan and early Christian times. Speaking of the remains of an ancient Greek building discovered in 1888, he says:—"These remains are of a great interest on account of the additional evidence they afford to the flourishing state of agriculture in these islands even in remote epochs, and to the existence of large plantations of olive trees at that time; an evidence which is further corroborated by the designation of the village 'Zebbug,' *i.e.* of olive trees, and of that of the other village 'Zeitun,' which means yielding oil. This discovery confirms, moreover, what has been stated on former occasions, that the eastern part of the island of Malta was in former days and at a remote period most inhabited and studded with large centres of habitation, of which nothing now remain but their relics and former nomenclature."[1] Diodorus Siculus refers to Malta under the name of *Melite* and Gozo under the name of *Gaulus*, and says:—"The inhabitants are very rich, inasmuch as they exercise many trades and in particular they manufacture cloths remarkable for their softness and fineness. Their houses are large and splendidly ornamented with projections and stucco."

When Carthage was at the zenith of its power, Malta appears to have been occupied by the Carthaginians, and was in their possession at the commencement of the first Punic war (264 B.C.). Several times the

[1] A. A. Caruana, 1888. See also his *Reports on Phœnician and Roman Antiquities*, 1881, 1882, 1885 and 1887.

islands were under the sway alternately of Carthaginians and Romans, and were finally held by the latter during the second Punic war (218 B.C.). Under the Romans the islands appear to have maintained their prosperity down to the commencement of the Christian era.

St. Paul was wrecked on the island of Malta in A.D. 58, and it appears to be admitted that this took place in the bay that now bears his name.[1] This circumstance led to the conversion of the Maltese to Christianity at a very early date; tradition says that the islanders have professed the Christian religion since it was first preached there by St. Paul. Christian monograms and inscriptions have been found dating back to the second century. A very large number of the extensive rock-cut subterranean tombs belong to the early Christian period, and are connected with places made out of the solid rock, evidently used for the celebration of religious ceremonies by the primitive Christians.

On the division of the Roman empire, in 395 A.D., the Maltese islands fell under the Eastern Empire, and the Vandals and Goths are said to have overrun the islands in the early part of the sixth century. However, a Byzantine garrison is mentioned as holding the islands in 870 A.D., in which year they passed to the Arabs, who held them for 220 years. If during this period the Maltese adopted the language of their conquerors, they did not adopt their religion, for the Norman knights, when they drove out the Arabs about 1090 A.D., were joyously welcomed by the Christian inhabitants. Malta passed under the authority of the German emperors in 1194 A.D., during whose occupation agriculture was totally neglected, under the Angevin kings of Sicily in 1266 A.D., and under the kings of Aragon in 1282 A.D., who held it for 248 years. In 1530 Malta and Gozo were taken possession of by the celebrated Knights of Malta, who held it for 268 years. In 1798 the Knights of Malta surrendered to Bonaparte, who remained six days on the island. In 1800 the French garrison surrendered to the British, and in 1814 the islands were formally ceded to the British Crown by the European Powers.

Population.—The Phœnician and Grecian remains show that in the earliest times these islands were the centre of an extensive trade and supported a large population. These remains, as well as the writings of Diodorus Siculus and other ancient authors, indicate a large amount of culture, comfort, and commerce, and the populations were then, in all probability, wholly supported by the produce of the islands. It is not possible to form any very correct idea of the actual number of the population in these early times. When the Arabs descended on the islands in 870 A.D. they are said to have put 3000 Greeks to the sword, and to have sold 3614 women and children for 5000 pieces of gold, which indicates a considerable population. When the Knights took possession it is said to have been 15,000, and to have been reduced to 10,000 after the memorable siege by the overwhelming force of Turks in 1568. In 1582 it is reported to have been 20,000. According to a census in 1632 the population was estimated at 50,113. In 1741 it was stated to be 110,000. When the French took possession in 1798 the number was

[1] James Smith, *Voyage and Shipwreck of St. Paul*, 1866.

114,000. Official returns in 1826 give the population of Malta and Gozo as 119,736. In 1881 the numbers were—Malta, 132,129; Gozo, 17,653; total, 149,782, exclusive of the English garrison, fleet, and their families, which numbered 10,000. The estimated population in March 1887 was—Malta, 138,826; Gozo, 18,627; total, 157,453. There are said to be 50,000 Maltese abroad, residing on the borders of the Mediterranean.

In Malta there are over 1471, and in Gozo 931 persons to the square mile. In England and Wales there are 446 to the square mile, and Belgium, the most densely populated country of Europe, has but 461 inhabitants to the square mile, so that the Maltese Islands are probably the most populous places in the world. This may be largely due to the passing trade, and to the presence of the British garrison and fleet. Malta is the port of call for the shipping engaged in the enormous trade that passes through the Suez Canal, between Europe and America in the west, and India, Australia, and other countries in the east, and since the British occupation enormous sums have been spent in making Malta one of the greatest fortifications of the world. We have seen, however, that Malta and Gozo supported large populations in times when none of these sources of wealth were in operation. They all along have been inhabited by a vigorous and prosperous race, which has an eventful history and often possessed a large measure of self-government. Whenever the inhabitants enjoyed security the fields were cultivated, ever yielding a sure return for the labour bestowed on them, and the population increased. When there was no security, as just before the arrival of the Knights, the cultivation of the islands was neglected and the population diminished. In tracing the geological history of the islands, I shall endeavour to show that prosperity has been quite as much dependent upon the fertility of the scanty soil, which is renewed year after year by natural processes, as upon the favourable geographical position or industry of the Maltese.

The population is almost exclusively Roman Catholic, and the difficulties about Maltese marriages now under discussion arise from the fact that canon law is recognised as the civil law of Malta. The population is increasing at a rapid rate, early marriages being encouraged by the Church, which provides each young woman with a small dowry. There is a large emigration of the surplus population to the northern shores of Africa, where the Maltese language is an advantage in trading with the Arabs, and where there is a demand for labour. Many of the large and beautiful churches met with throughout the islands have been built by voluntary labour, and nearly all the amusements and pastimes of the people are associated with Church festivals. There are many professional beggars in Valetta, but poverty in the proper sense of the term is practically unknown, the rural population being especially well-housed, regular, sober, industrious, and frugal. The peculiar dress at one time worn by the men has almost disappeared, but the graceful and becoming Faldetta is still worn by the women of all classes, with the exception of a few in Valetta, who of late years have adopted less elegant European head-dresses.

The language of the upper classes and of the law courts is Italian,

but Italian is not understood by the peasantry any more than English; indeed, in the country districts and in Gozo, it is rare to meet with any natives who can speak English or Italian. One is particularly struck with the slight impression our ninety years' occupation has had upon the habits and customs of the Maltese. "Should the British leave the islands to-morrow," remarked a Maltese gentleman, "there would be no more traces of them in ten years than there are now of Greeks, Romans, or Arabs." The country population appears to be remarkably stationary, and to have mixed little with, or to have been little modified by, the successive dominant races who have for various lengthened periods held possession of the islands. This gives some ground for the prevalent belief among the Maltese, that the basis of the population, as well as of the language, is of Phœnician, or at least Carthaginian, origin.

## GEOLOGY.

A few years ago I became interested in the microscopical structure of the Maltese rocks, from their resemblance in many respects to some of the deep-sea deposits collected during the *Challenger* Expedition. In the year 1888 I received from Surgeon David Bruce and Mr. Osbert Chadwick, a valuable series of rocks from the various strata in different parts of the islands, along with manuscript notes and sketches. I made a careful study of these specimens by means of numerous microscopic sections and chemical analyses. Subsequently, in the spring and summer months of the years 1889 and 1890, I paid visits to nearly every part of the islands with the view of studying the rocks *in situ*, and of observing their relation to each other.[1]

The rocks of Malta consist of a great series of nearly horizontal layers of crystalline, granular, or earthy limestones, together with a bed of greensand and a bed of stiff blue clay or marl; as follows :—

1. Upper Coralline Limestone (300 feet in Comino).
2. Greensand (from 0 to 35 feet).
3. Blue Clay (from 1 to 30 or 40 feet).
4. Globigerina Limestone (about 250 feet).
5. Lower Coralline Limestone (fully 500 feet).[2]

English authorities have classed these rocks sometimes as Eocene, sometimes as Miocene. Theodor Fuchs, who visited the islands in 1872, refers the two lower layers (4 and 5) to the Oligocene (Aquitanian), and the three upper (1, 2, and 3) to the Miocene. No. 1 he calls Leythakalk, No. 2 Greensand and Heterostegina Limestone, No. 3 Schlier, No. 4 Pecten layers of Schio, No. 5 Lower Limestone, and the whole series is, according to him, similar to the deposits of the Vienna basin. Seguenza regards the Malta rocks as Miocene, and compares them to similar deposits in Italy and Sicily. Many of the microscopic sections of the

[1] During my visits I was much assisted in my investigations by Messrs. C. H. Colson, J. H. Cooke, N. Tagliaferro, G. Gollcher, Rev. G. Wisely, Spiteri Bruno, and others.

[2] "Un Voyageur français" (1791), Boisgelin (1805), and Davy (1842), gave in their publications some account of the geology and petrifactions of the Maltese Islands, but the first

Globigerina limestone of Malta appear to me to be identical with the microscopic sections of Pliocene deposits of Sicily. While Spratt, Adams, and other English writers state that the fossils are nearly the same throughout the whole of the layers, Fuchs, on the other hand, finds a very marked difference between those of the three upper layers, which he considers Miocene, and the two lower ones, which he regards as Oligocene. He suggests that there has been some error in labelling the specimens which have been described by English writers, and that there has even been a mixture with specimens from the rocks at Syracuse. In addition to these Tertiary formations there are stretches covered with recent alluvium, and in some ravines, caves, fissures, and along the sides or at the heads of valleys, there are Quaternary deposits of red earth and rolled pebbles, in some of which numerous remains of extinct mammalia, birds, and reptiles, have been discovered. In one of these deposits at Marsa Scirocco, I found rolled fragments of a black limestone, which has not been found *in situ* on the islands.[1]

The accompanying geological map shows the distribution of these various strata in different colours, and is a modification of the one originally prepared by the Earl Ducie and Captain Spratt; it has been constructed for me, from the most recent surveys and latest information, by Mr. J. G. Bartholomew, F.R.S.E.

Malta is crossed by a grand fault nearly at right angles to its long axis, running from Madalena Bay on the north-east coast, to Foum el Rieh Bay on the opposite side of the island. A fault also runs across the south-eastern end of Gozo, nearly parallel to the grand fault in Malta. The land in the space between these two faults would appear to have been thrown down several hundred feet. In this way the great development of the upper coralline limestone in this region and the almost complete submergence of the lower coralline limestone, is to be

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systematic description was published in 1843 by Captain T. Spratt. The following is his classification of the rocks, slightly modified by A. Leith Adams :—

| | |
|---|---|
| No. 1.—Upper Limestone, greatest depth 250 feet, . . . . . (=Upper Coralline Limestone, Murray.) | White rubbly limestone.<br>Coarse-grained sandstone.<br>White or grey-brown bed.<br>Red coralline stratum. |
| No. 2.—Sand, greatest depth 60 feet, . (=Greensand, Murray.) | Red or yellow indurated rock.<br>Black, with red patches, sand.<br>Black-grained sand. |
| No. 3.—Marl, greatest depth 100 feet, . (=Blue Clay, Murray.) | Blue clay, with lighter-coloured bands. |
| No. 4.—Calcareous Sandstone, greatest depth 200 feet, . . . (=Globigerina Limestone, Murray.) | Pale grey rock.<br>Nodule seam.<br>Fawn-coloured rock, with nodules of selenite.<br>Nodule seam.<br>Irregular bands of green-coloured nodules.<br>Pale red or bluish rock.<br>White rock, with chert nodules, then a seam of nodules, and lowermost a pale yellow sandstone. |
| No. 5.—Lower Limestone, greatest depth above sea 400 feet, . . . (=Lower Coralline Limestone, Murray.) | Transition or scutella bed.<br>Nodule seam.<br>Concretionary and oolitic limestone.<br>Irregularly compact, sometimes semi-crystalline. |

[1] See Feilden and Maxwell, "Post-Pliocene Beds in Gozo."—*Il Barth*, p. 468; Valetta, 14th October 1874.

accounted for. The islands of Comino and Cominotto, which lie between these faults, are wholly composed of the upper limestone. There are some minor faults in St. Paul's Bay, and in the Melliha Valley, running across the whole width of Malta and parallel to the greater faults. Along the south coast of Malta — at Malak — there is also a fault with a great down-throw nearly at right angles to the above faults, which accounts for the fact that Filfla is wholly composed of upper limestone rocks, while the high cliffs of Malta opposite this islet are lower limestone and Globigerina limestone. In Gozo there is a fault apparently nearly parallel to this Malak fault, running from Miggiar Scini to the General's Rock. Near Ras il Kala and at Sclendi in Gozo, and also at Foum el Rieh Point in Malta, there are large triangular down-throws and up-throws. In sailing along under the high cliffs numerous other faults were observed, but it was impossible to trace them inland. At Macluba, near Krendi, there is a circular pit-like depression —a kind of circular fault—which seems to have resulted from a falling in of the strata, and there is a similar depression in Gozo near the General's Rock, described with some detail by Spratt. In the calcareous sandstone, or, as I prefer to call it, the Globigerina Limestone, there are numerous fissures and faults. These faults have an up- or down-throw varying from a few inches to six or seven feet. Similar small dislocations can be seen, but much less frequently and distinctly in the other formations. There is a slight dip in the strata to the NE. or ENE., the effect of which is that the lower beds are submerged along the eastern coasts, while they rise to a height of 300 feet along the opposite shores. There are numerous anticlinal folds, and near some of the faults the strata are tilted at considerable angles. On all sides, and on the surface of all the formations, there is abundant evidence of an immense amount of subaërial denudation.

I. Upper Coralline Limestone.—This is the uppermost of the Tertiary layers in the Maltese Islands. As will be seen by reference to the map, it covers large portions of the west and north-west districts of Malta, and forms a capping to almost all the higher hills of Gozo; the islands of Comino, Cominotto, and Filfla are entirely composed of these coralline rocks. In Comino the cliffs of this rock are 250 feet in height, and in places show distinct beds; but as a rule there is no marked bedding, but rather large patches of red, white, and yellow colour. Fuchs states that in their petrographical aspect these layers are identical with the *Leythakalke* of the Vienna basin. The texture of these rocks varies greatly, being sometimes rubbly, sometimes granular and porous, at other times compact and crystalline. Some layers appear to be wholly crystalline, and to have lost all traces of the original organisms of which they were doubtless composed. There are numerous casts of shells and other marine organisms, such as numerous large-sized Molluscs and Echinoderms, all indicative of a shallow-water deposit. When not composed of calcite of secondary formation, the rock is made up of the broken fragments of Nullipores, Corals, Echinoderms, Gasteropods, Lamellibranchs, Polyzoa, Crustacea, Ostracode valves, Serpula tubes, and

many Foraminifera. The general appearance of the rock and the contained organisms, as seen in a microscopic section, is represented in Plate I. fig. 1. In some of these sections the fragments of calcareous Algæ prevail, while in others fragments of Polyzoa, Corals, and Foraminifera are the most abundant.

The analyses of a number of specimens gave from 82·97 to 91·90 per cent. of carbonate of lime, and nearly all the specimens contained traces of phosphoric acid.[1] The residue, after the removal of the carbonate of lime by dilute acid, consists of clayey matter and oxide of iron, with minute fragments of quartz, felspars, augite, zircon, tourmaline, and a few grains of glauconite, none of these, with the exception of the glauconite grains, exceeding 0·5 mm. in diameter;[2] in some specimens a few sponge spicules were observed. The thickness of the Upper Limestone varies greatly; it is probably over 250 feet thick in the island of Comino, but on many of the Gozo hills it is only a few feet in depth, and is fast crumbling away through the destructive action of the weather and the disintegration of the underlying Greensand.

This rock, from the nature of its organisms, would appear to have been laid down in quite shallow water, probably less than 50 fathoms, and possibly in depths mostly under 20 fathoms. The deposits out of which these rocks have been formed were in all likelihood built up in a warm open sea not far from a continental shore, but removed from

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[1] A heavy granular specimen from the edge of valley at Ramla Bay, consisted almost entirely of carbonate of lime, with minute traces of phosphoric acid and magnesia. Five specimens from the summits of Gozo hills were all very rich in carbonate of lime, in one sample phosphoric acid (more than a trace) being present, and in another a trace of magnesia. No traces of phosphoric acid were observed in the samples from Comino, but a sample of a soil produced by the decomposition of the limestone, and procured from the top of the cliffs of this island, gave on analysis the following results:—

| | |
|---|---|
| Carbonate of lime ($CaCO_3$), | 16·75 |
| Phosphate of lime ($Ca_3 2PO_4$), | 2·22 |
| Iron and alumina ($Fe_2O_3$ and $Al_2O_3$), | 3·87 |
| Carbonate of magnesia ($MgCO_3$), | 0·44 |
| Residue insoluble in dilute acid, | 76·42 |
| | 99·70 |

The calcium phosphate is equivalent to 1·017 per cent. of phosphoric acid ($P_2O_5$).

The above insoluble portion was subjected to quantitative examination, and gave the following results:—

| | |
|---|---|
| Iron and alumina ($Fe_2O_3$ and $Al_2O_3$) [the latter predominating], | 62·65 |
| Silica, ($SiO_2$), | 31·99 |
| Magnesia, (MgO), | 1·97 |
| Lime (CaO), | 3·38 |
| | 99·99 |

Traces of phosphoric acid were obtained from two red-coloured, hard, and crystalline specimens from the upper edge of cliff, Lighthouse Hill. Two specimens from Citta Vecchia were white and friable, and contained traces of both phosphoric acid and magnesia. A cube cut by Mr. Chadwick from this stratum capping the hills round Notabile, shows traces of magnesia, but not of phosphoric acid.

[2] These mineral particles were determined by Professor A. Renard of Gand.

the embouchure of any large rivers. This appears to be indicated by the nature of both the organisms and the mineral particles.[1]

The following is a list of the Foraminifera observed in this formation :—

*Biloculina elongata*, d'Orbigny.
*Spiroloculina tenuis* (Czjzek).
*Miliolina seminulum* (Linné)
,, *oblonga* (Montagu) (?).
,, *trigonula* (Lamarck).
,, *subrotunda* (Montagu).
,, *auberiana* (d'Orbigny) (?).
,, sp. (?).
,, sp. (?).
*Alveolina melo* (Fichtel and Moll).
*Textularia gramen*, d'Orbigny.
*Verneuilina spinulosa*, Reuss.
*Tritaxia* sp. (?).
*Clavulina* sp. (?).
*Bolivina* sp. (?).
*Cassidulina crassa*, d'Orbigny.
*Lagena* sp. (?).
*Nodosaria mucronata* (Neugeboren).
*Polymorphina gibba*, d'Orbigny.
,, sp. (?).
*Globigerina æquilateralis*, Brady (?).
*Globigerina bulloides*, d'Orbigny.
,, *conglobata*, Brady.
*Discorbina globularis* (d'Orbigny).
,, *orbicularis* (Terquem).
*Planorbulina mediterranensis*, d'Orbigny.
,, sp. (?).
*Truncatulina lobatula* (Walker and Jacob).
,, *refulgens* (Montfort).
,, sp. (?).
,, sp. (?).
,, sp. (?).
*Pulvinulina patagonica* (d'Orbigny).
,, *oblonga* (Williamson).
*Nonionina boueana*, d'Orbigny (?).
*Polystomella crispa* (Linné).
,, *striatopunctata* (Fichtel and Moll).
*Amphistegina* sp. (?).

The most abundant species are *Miliolina seminulum* and *M. trigonula*.

[1] Mr. Colson supplies me with the following notes on building stones from the different layers of this formation :—" At the top of this Coralline Limestone, which contains four beds, is found the white rubbly limestone. This is entirely useless for any kind of building purposes, with the exception of very rough walls in the country, as it consists almost entirely of casts of shells, is very loose in structure, very porous, easily broken, and weathers into holes very quickly. This rock would probably make a fat lime if burnt. It is mostly found on the SW. hills and in some parts of Gozo. The second layer is almost identical in composition with the first, only differing in that the casts are very much smaller and the cementing material granular in appearance ; it is also, like the first, useless for building purposes of any but the roughest description. The third layer is much harder, closer in texture, and crystalline in structure, still containing large quantities of casts of shells, but they are generally smaller and harder than those in the beds above. This stone often presents a semi-translucent appearance. It is much used for building, especially in the districts where it outcrops, and, if well and carefully selected, is durable and weathers well. In some quarries the stone is much stratified in hard and soft layers, and great care is then required in selection. In the quarries of Melliha, for example, the stone in some parts is of the above character ; in others it is full of cavities and fissures containing soft white powder, and weathers very badly ; while in the remaining parts it is crystalline, semi-translucent in appearance, and, although it still sometimes contains numerous cavities, weathers very well. The stone quarried at Ta Ghalia, to the SE. of Citta Vecchia, is also from this bed, but, I think, from the lower part. The stone from this quarry is of two qualities : the better quality is the lower of the two, and is hard, crystalline, and translucent, contains very few cavities, only occasional casts of small shells, and weathers very well ; while the second quality is softer, whiter, contains larger and more numerous casts of shells, larger cavities, containing white powder, and weathers badly. The best stone from this quarry works well, and takes a good polish, and blocks of a large size can be obtained. The lowest bed is mostly exposed as a capping to the conical hills in Gozo. It is hard, consists almost entirely of imbedded casts and shells, varies in colour from red to yellow, and takes a good polish. It is quarried under the name of Gozo marble, but it is difficult to obtain in any but small blocks, as the bed is thin and fissured."

II. Greensand.—This is a characteristic Greensand, containing a very large number of true glauconitic grains, together with many Foraminifera and fragments of other marine organisms, in nearly all respects identical with the green sands now in course of formation in modern seas. It has hitherto been known as the Black and Yellow Sands. The stratum varies greatly in thickness; in some places it is from 20 to 50 feet in depth, but is frequently absent altogether. The upper layers are usually of a yellowish colour, from the oxidation of the outer surfaces of the glauconite grains; this yellow colour is especially characteristic of the water-bearing strata. Frequently the sand is quite black, and consists almost wholly of glauconite. A fine variety of this black sand is used as blotting for writings on paper.

The carbonate of lime ranged in ten specimens from 28·65 to 89·63 per cent., and consisted of fragments of Foraminifera, Polyzoa, Molluscs, Ostracodes, otoliths of fish, Echinoderms, calcareous Algæ, and other organisms. The remains of dugongs, manatees, dolphins, whales, and sharks have been discovered in these greensand layers, which were evidently deposited in deeper water than the overlying coralline limestone. In some instances in Gozo, and in the cliffs near Dingli in Malta, *Heterostegina* shells exist in enormous quantities, and the rock has been called a Heterostegina Limestone. These shells are frequently found in long rolls, the one shell being laid sideways against the other. In such a sample the carbonate of lime is as high as 91 per cent.

Phosphoric acid and magnesia were found to be present in all but two of twenty samples that were examined for these substances, the phosphoric acid being very abundant in some nodules from this layer.[1] The mineral particles left after the removal of the carbonate of lime by dilute acid consist of glauconite, felspars, quartz, augite, hornblende, magnetite, zircon, and tourmaline. The glauconite grains have a mean diameter of about 0·5 mm.; the other mineral particles rarely exceed 0·2 mm. in diameter. The general appearance of a microscopic section of this sand is shown in Plate II. fig. 2. The relative abundance of the different fragments varies greatly in specimens from different parts of the bed.

The passage between this bed of sand and the overlying Coralline Limestone is often difficult to trace, but it is frequently marked by a bed consisting almost entirely of grains of calcite, each having in the centre a minute particle of limonite; a few Foraminifera and fragments of other organisms can, however, be traced among the grains of calcite. This layer may be seen extending downwards into the sandbed at some points, and has apparently been formed after the elevation of the land. The Greensand has no great horizontal extension on the surface of the islands. Through its weathering easily the overlying Coralline Limestone is undermined and falls away, forming steep cliffs at the tops of the hills,

[1] Three yellow-coloured, friable specimens from the valley, Ramla Bay, and one from Nadur, contained small quantities of phosphoric acid and magnesia. Several red and yellow friable samples from Ghelmus contained much phosphoric acid, but no magnesia. Four samples from under the Upper Limestone at Lighthouse Hill contained both phosphoric acid and magnesia. Two specimens freshly cut from this stratum by Mr. Chadwick contained considerable quantities of phosphoric acid, but only traces of magnesia.

while the Greensand and Clay form the slopes at the base. It is this geological peculiarity which gives the Gozo hills the appearance of truncated cones, with table-like top [1] (see sketch at foot of map).

The following is a list of the Foraminifera observed in this formation :—

*Miliolina bicornis* (Walker and Jacob).
,, *seminulum* (Linné) (?).
*Planispirina celata* (Costa).
*Haplophragmium* sp. (?).
*Textularia sagittula*, Defrance.
,, *agglutinans*, d'Orbigny.
*Verneuilina spinulosa*, Reuss.
*Tritaxia* sp. (?).
*Gaudryina* sp. (?).
*Bolivina karreriana*, Brady (?).
,, *costata*, d'Orbigny.
*Lagena* sp. nov. (?).
*Nodosaria scalaris* (Batsch.)
*Cristellaria obtusata*, Reuss (?).
*Polymorphina elegantissima*, Parker and Jones.
,, *ovata*, d'Orbigny.
,, *lactea* (Walker and Jacob).
*Uvigerina asperula*, Czjzek (?).
*Globigerina bulloides*, d'Orbigny.
,, ,, var. *triloba*, Reuss.
,, *rubra*, d'Orbigny.
,, *inflata*, d'Orbigny (?).
*Orbulina universa*, d'Orbigny.
*Truncatulina ungeriana* (d'Orbigny).
,, *rosea* (d'Orbigny).
,, *lobatula* (Walker and Jacob).
,, sp. (?)
*Pulvinulina schreibersii* (d'Orbigny) (?).
,, *oblonga* (Williamson).
*Rotalia orbicularis*, d'Orbigny.
*Nonionina boueana*, d'Orbigny.
*Polystomella crispa* (Linné).
*Operculina complanata* (Defrance).
,, ,, var. *granulosa*, Leymerie.
*Heterostegina depressa*, d'Orbigny.

The most abundant species are :—*Miliolina seminulum*, *Gaudryina* sp., *Bolivina karreriana*, *Truncatulina ungeriana*, *Operculina complanata*, var. *granulosa*, and *Heterostegina depressa*.

III. Blue Clay or Marl.—This bed lies immediately under the Greensand, and has been estimated to have a thickness of thirty to forty feet in some places, but it is frequently much less, and occasionally it would appear to be wholly wanting, the Greensand or Heterostegina

[1] Mr. Colson says of the layers in this formation :—"The uppermost layer of the Greensand consists of a sandy rock indurated at the top with lime brought down with the water from the overlying stratum, and gradually passing at the bottom into the sand. It varies from hard to soft, and from white and yellow to red in different localities, and almost always contains black grains. The black and yellow sands with red patches in places follow next in order. These are utterly useless as stone, breaking up rapidly under the fingers, and, as they contain a large amount of clayey and calcareous matter, are not adapted for making mortar without very thorough washing ; as the outcrop is usually on a hill, the expense of cartage and washing would be very great in comparison with that of screening the dust and cuttings from working the third quality stone, so that it is never used. The most important outcrops of this stratum are on the SW. side of Malta, and at the top of the hills in Gozo. The next bed beneath is of a yellowish colour, containing more clayey matter than the layer above, and is sometimes more compact and harder, but is still entirely useless for any kind of building. It contains black grains from the layer above and indeed passes, in some places, insensibly into it. A lower bed consists of the same materials as the overlying layer, except that it does not contain so many of the black grains ; it is harder, but still soft and useless for building except rough work. It contains large numbers of enormous flat sea urchins. Fort Chambray in Gozo is partially built on this stratum, and stone from it has been used for building the walls of the old cemetery. These walls have weathered very badly, and show the harder fossils in high relief."

Limestone then resting directly on the great Globigerina formations to be presently described. Along many parts of the coasts, as at Fort Chambray and Ramla Bay in Gozo, huge mounds are met with sloping down to the sea and covering the lower formations; in these positions it appears to have been washed or forced out of its original position between the other formations. In all cases it is difficult to estimate the thickness of this clay, as it is usually banked up in terraces along the slopes of the hills, but it probably rarely exceeds 20 feet.

This clay is generally water-tight, so that the engineers in search of water always stop sinking when they strike this bed. Were it not for the retentive nature of this bed of clay, Malta and Gozo would have little if any water supply. At the level of this layer the Maltese run in tunnels to collect water for irrigation and other purposes, and the famous aqueducts, constructed over 200 years ago, carry water to Valetta from this layer for a distance of about eight miles. In two typical examples the carbonate of lime was 2·56 and 5·12 per cent. respectively of the whole deposit, but in some samples this clay or marl contained as much as 30 per cent. of carbonate of lime.[1] The carbonate of lime consists chiefly of Foraminifera and Coccoliths and Coccospheres, and among the Foraminifera *Globigerinæ* of the same species as those in the Globigerina Limestones are the most abundant. The mineral particles are likewise mostly identical in size and nature with those found in the Globigerina Limestones beneath, consisting of angular and rounded grains of quartz, augite, hornblende, glauconite, felspars, zircon, and tourmaline. The clay contains sulphate of lime, and iron pyrites is abundant, having collected around many of the fossils so as to render them indistinguishable. The lighter-coloured bands of the upper layers of the Clay are due to the higher state of oxidation of the iron in them, arising from contact with the water which rests on this and partially fills the Greensand above. This Blue Clay seems to be identical in its mineralogical composition with the residue of the blue patches in the Globigerina series to be mentioned hereafter. Fuchs at first believed this clay to be equivalent to the "Tegel" of Baden, but later, from a study of the organic remains, he considered it identical with the *Schlier* formation of the Vienna basin.

The clay is used for pottery when mixed with sand, and as puddle for dams in engineering works. For this last purpose it is wanting in cohesion, becoming gradually soft and wasting away when exposed to running water or rain. Several of the layers immediately underlying the clay are of a blue colour, and are regarded by some observers as belonging to the clay or marl; indeed, in some places there is a gradual transition from the clay to the Globigerina series, and it is difficult to say where the one begins and the other ends. Whenever the percentage of

[1] Two specimens from a cave near Fort Tigne contained phosphoric acid and magnesia in small quantities. In a specimen from marl heap, Ramla Bay, were found small quantities of magnesia and traces of phosphoric acid. Two specimens underlying the Greensand at Lighthouse Hill, Gozo, gave small quantities of phosphoric acid and traces of magnesia. Two cubic blocks cut by Mr. Chadwick yielded small quantities of phosphoric acid and traces of magnesia.

carbonate of lime is less than 30 per cent. I have regarded the layer as belonging to the clay.

The following is a list of the Foraminifera observed in this formation :—

*Spiroloculina tenuis* (Czjzek).
,, *tenuiseptata*, Brady.
*Miliolina oblonga* (Montagu).
,, sp. (?) [cast].
*Planispirina celata* (Costa).
*Haplophragmium pseudospirale* (Williamson).
*Textularia trochus*, d'Orbigny.
,, *agglutinans*, d'Orbigny.
,, sp. (?).
*Gaudryina pupoides*, d'Orbigny.
*Clavulina communis*, d'Orbigny.
,, *cylindrica*, Hantken.
*Bulimina pupoides*, d'Orbigny.
,, *buchiana*, d'Orbigny.
,, *elongata*, d'Orbigny.
,, *inflata*, Seguenza.
,, *elegans*, d'Orbigny.
,, ,, var. *exilis*, Brady (?).
*Virgulina schreibersiana*, Czjzek.
*Bolivina textilarioides*, Reuss.
,, *karreriana*, Brady.
,, *hantkeniana*, Brady (?).
,, *dilatata*, Reuss.
,, *pygmæa*, Brady.
,, *punctata*, d'Orbigny.
,, *costata*, d'Orbigny.
,, *limbata*, Brady.
,, *nobilis*, Hantken.
,, *robusta*, Brady.
,, *nitida*, Brady.
,, *reticulata*, Hantken (?).
,, *beyrichi*, Reuss.
,, ,, var. *alata*, Seguenza.
*Cassidulina crassa*, d'Orbigny.
,, *bradyi*, Norman.
,, *subglobosa*, Brady.
,, *lævigata*, d'Orbigny.
*Ehrenbergina serrata*, Reuss.
*Lagena acuticosta*, Reuss.
,, *orbignyana* (Seguenza).
,, *sulcata* (Walker & Jacob).
*Nodosaria* (*Glandulina*) *rotundata*, Reuss.
,, ,, *lævigata*, d'Orbigny.
,, *radicula* (Linné).
,, *hispida*, d'Orbigny.
,, *consobrina*, d'Orbigny.
,, ,, var. *emaciata*, Reuss.
,, ,, var. (?).
,, *obliqua* (Linné).
,, *scalaris* (Batsch).
*Nodosaria communis*, d'Orbigny.
,, *verruculosa*, Neugeboren.
,, *abyssorum*, Brady.
,, *pyrula*, d'Orbigny (?).
,, *roemeri* (Neugeboren).
,, *raphanus* (Linné).
,, *vertebralis* (Batsch).
,, *catenulata*, Brady (?).
,, sp. (?).
,, sp. (?).
*Frondicularia inæqualis*, Costa.
*Rhabdogonium tricarinatum* (d'Orbigny).
*Marginulina glabra*, d'Orbigny.
,, sp. (?).
,, sp. nov. (?).
*Vaginulina* sp. nov. (?).
*Cristellaria nitida*, d'Orbigny.
,, *compressa*, d'Orbigny.
,, *italica* (Defrance).
,, *costata* (Fichtel & Moll).
,, *gibba*, d'Orbigny.
,, *rotulata* (Lamarck).
,, *echinata* (d'Orbigny).
,, *calcar* (Linné).
,, *cultrata* (Montfort).
,, *papillosa* (Fichtel & Moll) (?)
,, *articulata*, Reuss.
,, *vortex* (Fichtel & Moll).
,, *orbicularis* (d'Orbigny).
,, *crassa*, d'Orbigny (?).
,, *tenuis* (Bornemann).
*Polymorphina elegantissima*, Parker & Jones.
,, *gibba*, d'Orbigny.
*Uvigerina pygmæa*, d'Orbigny.
,, ,, var. (?).
,, *brunnensis*, Karrer. (?).
,, *asperula*, Czjzek.
,, *angulosa*, Williamson (?).
,, sp. (?).
*Sagrina dimorpha*, Parker & Jones.
,, *virgula*, Brady.
,, *striata*, Schwager.
,, *columellaris*, Brady (?).
*Globigerina bulloides*, d'Orbigny.
,, ,, var. *triloba*, Reuss.
,, *inflata*, d'Orbigny.
,, *sacculifera*, Brady.
,, *æquilateralis*, Brady.
,, *helicina*, d'Orbigny.
,, *dubia*, Egger (?).

*Globigerina conglobata*, Brady.
,, sp. nov. (?)
,, sp. nov. (?)
*Orbulina universa*, d'Orbigny.
*Pullenia quinqueloba*, Reuss.
,, *sphæroides* (d'Orbigny).
*Sphæroidina bulloides*, d'Orbigny.
*Discorbina* sp. (?)
*Truncatulina reticulata* (Czjzek).
,, *præcincta* (Karrer.).
,, *haidingerii* (d'Orbigny).
*Truncatulina ungeriana* (d'Orbigny).
,, *pygmæa*, Hantken.
*Anomalina ammonoides* (Reuss).
*Pulvinulina schreibersii* (d'Orbigny).
,, *patagonica* (d'Orbigny).
,, *karsteni* (Reuss).
,, *oblonga* (Williamson).
,, sp. (?).
*Rotalia soldanii*, d'Orbigny.
*Nonionina pompilioides* (Fichtel & Moll).
*Amphistegina lessonii*, d'Orbigny.

IV. Globigerina Limestone.—The great series of rocks known under the name Calcareous Sandstones are much better designated by the term Globigerina Limestones, for they are chiefly composed of these minute shells and their broken-down remains, and none of the beds are largely made up of quartz sand, though that idea is conveyed by the word sandstone. The upper beds of the series have generally a blue or grey colour, and contain more clayey matter than the lower ones, which are for the most part red or rose-coloured. Indeed, the transition between the overlying clay and the upper beds of the Globigerina series is very gradual, so that some of the beds which I place here have been regarded by others as belonging to the clay or marl. These upper beds are especially characterised by a large number of irregular hematite nodules containing silica, alumina, manganese, phosphoric acid, and lime. These bluish-coloured beds in cliff sections often break up and form mounds in the same manner as the overlying clay, and are frequently interrupted by beds of a lighter colour. The lower beds supply most of the building-stone of the country, known among builders as third quality stone, first and second quality stone being derived from the crystalline beds of the Upper and Lower Coralline Limestones. The third quality stone is easily cut into large blocks by means of saws, and with axes and chisels it can be rapidly hewn into any required shape.[1]

While these rocks are for the most part of a reddish or yellow colour, along the cliffs on the coasts and in the cutting for the New Dock there are large more or less circular bluish patches, and it is noticed that these blue patches are removed to the greatest distance from faults and fissures. In the bluish or grey-coloured upper beds, and even in the overlying blue clay itself, the rocks on each side of a fissure have a red colour, the thickness of this reddish band on either side of the fault or fissure being less, as a rule, the more clay the bed contains.

The microscopic sections of the red rocks and the blue patches show no difference, so far as concerns the organisms, but the blue patches contain iron pyrites, which is absent in the red rock through oxidation, the iron pyrites often filling the Foraminifera and forming casts of the shells.

[1] Mr. C. H. Colson has shown that the Globigerina Limestone will absorb about one-fourth of its bulk of water in 24 hours, while the Upper and Lower Limestones will absorb only two or three per cent. of their bulk in the same time. One may thus readily believe that the foundations of Valetta and other towns situated on the Globigerina Limestones are saturated with the sewage of centuries.

The following are analyses of two samples provided for me by Mr. Colson from the new dock, at the same level, the one being from a blue patch (No. 2), the other from the red rock (No. 1).

No. 1 has a light reddish yellow colour which is retained on drying at 100° to 110° C. Dried sample gave on analysis:—

| | |
|---|---|
| Carbonate of Lime ($CaCO_3$), | 80·24 |
| Phosphate of Lime ($Ca_32PO_4$), | 3·57 |
| Magnesium Carbonate ($MgCO_3$), | 1·63 |
| Calcium Sulphate ($CaSO_4$), | 0·06 |
| Iron and Alumina ($Fe_2O_3$ and $Al_2O_3$), | 1·13 |
| Insoluble in dilute HCl (1 in 10), | 12·88 |
| | 99·51 |

The part insoluble in HCl consists of ferric oxide, alumina, silica, and a small quantity of lime, but no phosphoric acid or sulphur compound. The silica seems to be mainly in combination with the alumina.

No. 2 has a light bluish green colour, which is retained on drying at 100° to 110° C. Dried sample gave on analysis:—

| | |
|---|---|
| Carbonate of Lime, Iron and Alumina ($CaCO_3Fe_2O_3$ and $Al_2O_3$), | 78·39 |
| Phosphate of Lime ($Ca_32PO_4$), | 2·70 |
| Magnesium Carbonate ($MgCO_3$), | 0·44 |
| Calcium Sulphate ($CaSO_4$), | 0·33 |
| Insoluble in dilute HCl (1 in 10), | 17·87 |
| | 99·73 |

The insoluble residue contains iron (chiefly in the ferrous condition), alumina (abundant), lime (small quantity), no phosphoric acid, traces of sulphur. The iron seems to be combined as silicate, as some difficulty in decomposing the compound was experienced, the colour remaining green even after repeated treatment with HCl, and subsequent evaporation. The sulphur is present as sulphide (pyrites, $FeS_2$), which on oxidation in the presence of bases would give $Fe_2O_3$, while calcium sulphate would probably be formed.

It thus appears more than probable that these blue patches will ultimately disappear with further oxidation; indeed it is evident to me that at the time these Globigerina rocks were first raised above the sea they were all of a blue colour, and that the red colour is entirely due to subsequent oxidation, the more porous calcareous beds having been oxidised at a more rapid rate than those containing a large quantity of clayey matter. Did we know the rate of this oxidation, we might calculate approximately the date at which these rocks were elevated from the sea, or the water-bearing fissures were formed.[1]

[1] The Messrs. Colson hold similar views as to the origin of the blue patches, and Mr. C. H. Colson has attempted such a calculation. They found in the centre of an old wall, built by the Knights 200 years ago, some stones of this blue rock entirely surrounded by a red zone 1½ inches in width—the result of oxidation since placed in the wall—say 1 inch in 133 years. The average distance of the water-bearing fissures from the blue patches is, at the New Dock, 5 feet. This would give, at the above rate, 7980 years since oxidation commenced from the fissures. It would really be a much longer time, for the rate of oxidation would be slower as the distance from the fissures increased, assuming the other conditions to be constant.

About nine or ten distinct beds are recognised, which, however, are occasionally locally developed, thinning out and disappearing in different directions. These beds differ considerably in colour, hardness, texture, and microscopic characters of the organisms or organic fragments. An examination of about forty microscopic sections of samples from different horizons and localities shows that the whole of the beds are principally made up of the shells of pelagic *Globigerinæ* and their broken-down remains. Mixed up with these are a few *Truncatulina*, *Pulvinulina*, and *Rotalia* shells, Ostracode valves, Echinoderm spines, and remains of other marine deep-water organisms. The general appearance of a typical specimen under the microscope is shown in Plate II. fig. 1. In some instances the *Globigerina* shells make up fully 80 or 90 per cent. of the whole rock. Some of the layers, on the other hand, are largely made up of amorphous carbonate of lime. In one stratum, immediately underlying one of the nodule beds, there are numerous small rhombohedral crystals of calcite, while Coccoliths, Coccospheres, and Rhabdoliths are abundant in several of the other beds. Pteropods are nowhere abundant, but their remains can be detected in many specimens of the rock, and their casts (*Hyalæa* and *Vaginella*) in phosphate of lime are numerous in and close to the nodule beds. Specimens of *Brissopsis* and of a small *Pecten* are numerous throughout these layers, but there is an absence of the large Molluscs and Echinoderms so numerous in the Greensand and Upper Coralline Limestone.

The analyses of a large number of characteristic samples of these rocks show that the percentage of carbonate of lime ranges from 63·20 to 94·73, but some of the upper transition beds contain only 30 to 40 per cent. They all contain traces of phosphate of lime and nearly all have in addition carbonate of magnesia. The phosphate of lime in many samples of the ordinary rock rises to 3 and 4 per cent., and the nodules from the various nodule beds contain frequently from 30 to 40 per cent.[1]

The residue left on the removal of the carbonate of lime by dilute acid consists of clayey matter, with oxides of iron, glauconite and minute mineral particles, these last consisting of splinters of quartz, felspars, tourmaline, zircon, rutile, augite, and hornblende; it is rare that any of these mineral particles exceed 0·1 mm. in diameter. It is this residue

[1] Five specimens were taken from watercourse below Inna Fora, Gozo; two of these gave indications of phosphoric acid in some quantity and traces of magnesia, while in three no phosphoric acid could be detected. A specimen from cliff above Ras il Kala gave indications of a small quantity of magnesia and traces of phosphoric acid. Three specimens from Fort Tigne gave no indications of phosphoric acid; in two, however, there were small quantities of magnesia. Two specimens from cliff at Lighthouse Hill contained small quantities of phosphoric acid and magnesia. Three specimens from a seam, half-a-mile west of Wied Talassiri valley, contained quantities of phosphoric acid, while one specimen yielded a considerable amount of magnesia. One specimen from Foum el Rieh Bay, and three from Citta Vecchia gave small quantities of phosphoric acid and traces of magnesia. A specimen from nodule bed, Casal Siggieui, contained traces of magnesia and a considerable quantity of phosphoric acid. Twelve specimens in the form of cubes were taken from the railway cutting at Notabile, and from shafts by Mr. Chadwick; these contained in the majority of cases only traces of magnesia, but the phosphoric acid was present in considerable quantities.

of the Globigerina Limestones that forms the greater part of the soil in all those portions of the islands where these rocks occupy the surface of the land.

The nodule beds are a characteristic feature of the Globigerina rocks, there being four or five of these at different horizons, two extending throughout the whole islands and others occurring locally or in patches. These beds are from a few inches to three or four feet in depth, and consist of an agglomeration of rounded pebble-like concretions, having a brown colour and often a smooth, glazed surface. The nodules vary from the size of a pea to several inches in diameter, are all phosphatic, and mixed up with them are numerous casts of shells, Corals, and Echinoderms, also phosphatic, together with remains of whales and other marine mammals, turtles, sharks, Teleostean fishes and Crustaceans. One bed rests upon a fawn-coloured rock, containing many minute crystals of calcite, and different in several respects from the rock in which the nodules are imbedded, but bands and patches of nodules occur where no microscopic or chemical difference can be observed in the rock above or below. Some of the microscopic sections of the nodules are different in texture from the matrix in which they are imbedded, but the great majority consist largely of *Globigerinæ* and other organic fragments, the same as in the surrounding Globigerina limestone, the only difference being the yellow colour due to the presence of phosphate of lime. The following are analyses of one of the typical nodules, and of the interstitial cement or rock in which they are imbedded :—

NODULE from Nodule Bed, Foum el Rieh Bay, Malta.

| | |
|---|---|
| Sulphate of Lime ($CaSO_4$), . . | 2·26 |
| Carbonate of Lime ($CaCO_3$), . | 47·14 |
| *Phosphate of Lime ($Ca_3 2PO_4$), . | 38·34 |
| Alumina ($Al_2O_3$), . . . | 5·98 |
| Oxide of Iron, ($Fe_2O_3$), . . | trace |
| †Residue, . . . . . | 6·08 |
| | 99·80 |

* Equivalent to 17·47 per cent. $P_2O_5$.

† The residue contains iron oxide in the ferric condition, alumina, a small quantity of silica and lime, but no phosphoric acid.

INTERSTITIAL CEMENT.

| | |
|---|---|
| Carbonate of Lime ($CaCO_3$), . | 86·69 |
| *Phosphate of Lime ($Ca_3 2PO_4$), . | 1·24 |
| Sulphate of Lime ($CaSO_4$), . . | 0·07 |
| Alumina ($Al_2O_3$), . . . | 1·28 |
| †Insoluble in dilute acid, . . | 9·87 |
| | 99·15 |

* Equivalent to 0·568 per cent. of $P_2O_5$.

† This residue was red in colour and on examination yielded a small quantity of $Fe_2O_3$, abundant alumina, a quantity of silica, while lime was present, but no phosphorus or sulphur compound could be detected.

These nodules have hitherto been described as rolled pebbles, but they have evidently been formed *in situ* at the bottom of the sea, and are almost precisely similar to the phosphatic nodules dredged from modern sea-beds by the Challenger and other deep-sea expeditions. Nodules of chert and flint are found in some of the layers, and Mr. Colson has a large specimen of fossil amber found in the Globigerina Limestones at the New Dock, similar in all respects to the fossil amber in the Tertiary deposits of Sicily.[1]

By reference to the map it will be seen that these Globigerina Limestones occupy the surface in all the east and south-east portions of

[1] Mr. Colson says:—"The Globigerina Limestone seems to be divided into nine separate beds or layers, but of course these are not continuous in all places, as they thin out and disappear in different sections. No. 1, the first or uppermost layer, is a pale grey rock, and is well developed in the cliffs above the Monscair Rocks. This rock is quite soft, weathers badly, scaling off in successive flakes when exposed to the weather. It is of a dark bluish grey colour when freshly cut, but rapidly dries to a pale grey when exposed. It is not used for any but the roughest kinds of building. No. 2, the top nodule seam, is of no use at all in building. It consists of a conglomerate of shells, casts of shells in a peculiar dark brown polished material, corals, etc., in a brownish matrix which varies, in different places, from hard to soft. No. 3 is a thin layer of soft stone containing small nodules of selenite, manganese, etc. No. 4 is a nodule seam with the same characteristics as No. 2 layer, but rather thicker. All the nodule seams contain numbers of sharks' teeth, as, indeed, do all the layers in the calcareous sandstone and clay, but it is from this layer that the most plentiful supply is obtained by collectors. No. 5 is a band of greenish nodules often partially imbedded in the overlying layer. As far as I have seen, the green colour seems to be only on the surface of the fossils and nodules, and does not penetrate their substance. No. 6 is a pale red, yellow, or bluish rock. This bed has been cut through in making the new dry dock in the Naval Dockyard, to a depth of 130 feet, and from the evidence obtained in this cutting, it would appear that the whole of this rock was originally of a bluish grey colour. The stone from this bed weathers badly, but it is used for foundations and rough walls or inside thick masses of building, as it stands well when not exposed to the air. Fossils of any kind are very scarce in this bed. No. 7 is a whitish yellow fine-grained rock, with small nodules of chert, or hard substance resembling chert, scattered about in it. This bed and the underlying layer (No. 9), are the ones from which the greatest amount of building stone is taken. This layer, however, from being slightly harder, and from being more difficult to work, owing to the chert nodules, is not so much used as the one below, the average cost of working being about one-third more. The principal quarry of this stone is at Imghieret. In quarrying, a block is separated out by cutting a trench 4″ wide all round it, and it is then wedged up from the bottom. The mass is then split into smaller blocks with wedges, and dressed to the required size with large and heavy axes. No. 8 is a thin line of nodules, often missing, and of no use whatever for building purposes. No. 9: It is from this bed that the greatest quantity of building stone used in the island is obtained. It is a pale yellow limestone, mainly composed of very minute fossils; is soft and easily worked, but hardens somewhat when exposed to the air; weathers very well, and turns after a time to a light reddish brown colour. The stone is easily quarried with wedges, and dressed to size with broad-bladed axes. The principal quarries of this layer are at a place called Ta Daul. The quarries there, in section, are as follows:—About 2 feet surface soil, then 6″ to 2′ of broken and rotten rock called 'Torba'; below this 25 to 40 feet of good stone, followed by a layer of darker stone that will not stand exposure, called 'Saul.' This saul is, however, often used for foundations or in other situations where it is protected from the air. The good stone when quarried can be readily split up into thin slabs, which are used for paving stones in the island, and are also exported in large quantities to Turkey and other countries on the shores of the Mediterranean. Roofs are also made of thin slabs of this stone laid on timber beams, and covered with a layer of soft stone and chippings rendered with a mixture of puzzolana, lime and broken pottery, beaten down hard. No fossils of any size are found in this bed, except occasionally remains of saurians, etc., and a few shells.

Malta, and altogether over one-half of the surface of the whole islands. Fuchs regards these Globigerina Limestones and the underlying Coralline Limestone, as being of Oligocene age, and belonging to the upper (Aquitanian) series of the group, similar to those developed in Bromida in Italy.

These Globigerina Limestones appear to me to have been formed in deep water (300 to 1000 fathoms), at some distance from a continental shore, but still within the influence of the detrital matter brought down from the land by rivers.

The following is a list of the Foraminifera observed in this formation :—

*Spiroloculina tenuis* (Czjzek).
*Haplostiche soldanii* (Jones and Parker).
*Textularia conica*, d'Orbigny.
,, *agglutinans*, d'Orbigny.
,, *gramen*, d'Orbigny.
*Gaudryina pupoides*, d'Orbigny.
*Clavulina communis*, d'Orbigny.
,, *cylindrica*, Hantken.
*Bulimina ovata*, d'Orbigny.
,, *inflata*, Seguenza.
*Bolivina dilatata*, Reuss.
,, *robusta*, Brady.
,, *punctata*, d'Orbigny (?).
,, *beyrichi*, Reuss.
,, ,, var. *alata*, Seguenza.
*Cassidulina crassa*, d'Orbigny.
,, *subglobosa*, Brady.
*Ehrenbergina hystrix*, Brady.
*Lagena* sp. (?).
*Nodosaria* (*Glandulina*) *rotundata*, Reuss.
,, *radicula* (Linné).
,, *hispida*, d'Orbigny.
,, *roemeri* (Neugeboren).
,, *communis*, d'Orbigny.
,, *obliqua* (Linné).
,, *consobrina*, d'Orbigny.
*Rhabdogonium tricarinatum* (d'Orbigny).
*Vaginulina* sp. (?).
*Vaginulina* sp. nov. (?).
*Cristellaria convergens*, Bornemann.
,, *vortex* (Fichtel and Moll).
,, *cultrata* (Montfort) (?).
,, *calcar* (Linné).
*Uvigerina pygmæa*, d'Orbigny.
,, *tenuistriata*, Reuss.
*Sagrina virgula*, Brady.
*Globigerina bulloides*, d'Orbigny.
,, ,, var. *triloba*, Reuss.
,, *rubra*, d'Orbigny.
,, *inflata*, d'Orbigny.
,, sp. (?).
*Orbulina universa*, d'Orbigny.
*Pullenia sphæroides* (d'Orbigny).
*Sphæroidina bulloides*, d'Orbigny.
*Discorbina bertheloti* (d'Orbigny).
,, sp. (?).
*Truncatulina reticulata* (Czjzek).
,, *ungeriana* (d'Orbigny).
,, *præcincta* (Karrer.).
,, *haidingerii* (d'Orbigny).
*Anomalina ammonoides* (Reuss).
*Pulvinulina berthelotiana* (d'Orbigny).
,, *oblonga* (Williamson).
*Rotalia soldanii*, d'Orbigny.
,, sp. (?).
*Nonionina pompilioides* (Fichtel & Moll).

The species of Globigerinidæ are by far the most abundant in this formation.

V. Lower Coralline Limestone.—This formation, which is the lowest of the Malta series, is more crystalline than any of the others; it is generally semi-crystalline, but occasionally it is granular, and in very many respects resembles the Upper Coralline Limestone. The harder varieties are sometimes known as Maltese and Gozo marbles and granites; the same names are applied also to some of the harder varieties of the Upper Coralline Limestones. The Lower Coralline Limestone contains numerous fossils, but these are not easily removed in a perfect condition owing to the hard crystalline nature of the rock.

Over twenty specimens of this rock were examined by means of microscopic sections. Some of the sections showed that the rocks

consisted almost entirely of Nullipores (*Lithothamnion*) and other calcareous Algæ, mixed up with which were a few Foraminifera and other organisms. In other sections the calcareous Algæ were not so abundant, and there were numerous Foraminifera belonging to the genera *Orbitoides*, *Heterostegina*, *Alveolina*, *Nummulites*, *Miliolina*, and *Operculina*, together with fragments of Molluscs, Polyzoa, Corals, and Echinoderms. The general appearance of a typical specimen is shown in Plate I. fig. 2. The size and character of the organisms seem to show that this layer, like the Upper Coralline Limestone, was laid down in comparatively shallow water, probably in less than 50 fathoms. The Scutella and nodule bed, which is regarded as the upper layer of the Lower Coralline Limestone, appears, however, to have been laid down in deeper water than the lower layers, for this rock is made up of much smaller fragments; there are a few *Globigerina* shells present, while the other Foraminifera are smaller, and the fragments of calcareous Algæ are more minute and much less abundant than in the lower beds. The nodular masses in the phosphatic layers are different in appearance from the phosphatic nodules in the Globigerina Limestone, being much larger and more irregular. In those portions which are wholly crystalline, no trace of organisms can, of course, be detected.

The analyses of three typical specimens gave respectively 98·58, 95·66, and 98·14 per cent. of carbonate of lime. The residue after the removal of the carbonate of lime by dilute acid was reddish in colour, and consisted of clayey matter, oxide of iron, and a few minute grains of quartz, augite, felspars, tourmaline, and glauconite; the largest fragments of these minerals did not exceed 0·1 mm. in diameter. Phosphoric acid and magnesia were present in small quantities in some of the specimens, but usually these substances were less abundant than in the upper series of the Malta rocks.[1] The colour of these Lower Coralline rocks varies from nearly pure white to red or cream and grey colour, and they crop out in different places all along the north-east and south coasts of Malta as far as the Great Fault, and in the interior along the edge of this fault, which divides Malta into two districts. They form many of the high sea cliffs, but do not occupy a large portion of the surface of the islands.[2]

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[1] Two specimens from Fort Tigne, three from Tigne Point, and four specimens from the Redoubt at Ras il Kala, gave traces of magnesia but no phosphoric acid. One or two specimens from oyster bed north of Redoubt contained a trace of phosphoric acid and a small quantity of magnesia. Two specimens from the valley of Wied Talassiri contained no phosphoric acid, but small quantities of magnesia. Five specimens cut from a shaft in Wied Islanda (?) by Mr. Chadwick gave no, or at most but a trace of, phosphoric acid, and small quantities of magnesia.

[2] Mr. Colson supplies the following notes on the building-stones:—"The Lower Limestone is the lowest and most extensively developed of the strata of Malta and Gozo, cliffs in the latter island rising 400 feet from the sea, being composed entirely of its different layers. From this stratum, or from the Upper Coralline Limestone, all the stone locally known as first and second quality hard stone is obtained, the difference between the two qualities being that, in the first, recrystallisation has taken place, while in the second the stone is in its original condition. Both the qualities are found in the same quarries; the second usually above the first, but often intermixed with it. The kind known as first quality is hard, crystalline, non-porous, generally varying in colour from brownish yellow to white in different localities, weathers very well and works easily, splitting straight and smooth. The second

The following is a list of the Foraminifera observed in this formation :—

*Spiroloculina* sp. (?).
*Miliolina* sp. (?).
*Alveolina melo* (Fichtel & Moll).
*Textularia trochus*, d'Orbigny (?).
*Clavulina communis*, d'Orbigny (?).
*Bolivina* sp. (?).
*Globigerina* sp. (?).
*Planorbulina mediterranensis*, d'Orbigny.
*Carpenteria utricularis*, Carter.
*Gypsina* sp. (?).
*Heterostegina* sp. (?).
*Cycloclypeus* sp. (?).
*Rotalia soldanii*, d'Orbigny (?).
*Nummulites* sp. (?).

The most abundant forms are :—*Alveolina melo*, *Heterostegina* sp., *Cycloclypeus* sp., and *Nummulites* sp.

QUATERNARY DEPOSITS.—Dr. Leith Adams, Spratt, Caruana, and others, have examined these deposits in many of the caves and fissures of Malta. Their general results may be thus summarised :—

*Gandia Fissure.*—Unfortunately Dr. Adams was not the first to explore this cave, yet, when re-opened by him, a large collection of bones

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quality stone is softer than the first, is composed of distinct grains of varying sizes in different quarries, is porous, works easily, and weathers well, but not so well as the first. The uppermost bed is called the Transition, or Scutella, bed ; it is not so much used for building as that from the third or bottom bed, as it is softer, often partly mixed with and merging into the calcareous sands of the overlying stratum, and contains more remains of Echini than the bed below. The stone quarried at Sannat, in Gozo, is from this bed. It is of a light yellowish brown colour, often spotted in all directions with brown spots (apparently caused by iron) and patches of softer stone, giving it a very disagreeable appearance, is fine-grained and not very durable, the stone decaying away and leaving the harder Echini projecting. This bed also crops out near Musta, in Malta, but here the stone is better and more crystalline than that from Sannat, although the two qualities (first and second) are much intermixed, and the stone therefore wears unevenly. The colour is cream or white. The nodule seam below the Scutella bed is of no use in building ; it is to be seen in the quarries at Ghar-id-Dorf, in Gozo. Beneath this nodule bed is the lowest known bed of the strata of Malta and Gozo, and from this the greater part of the first and second quality stone is quarried. It crops out at many different places, both in Malta and Gozo. The principal quarries are :—1st, Hondok-ir-Rummien, where the stone varies in colour from dark to light brownish yellow, with occasional patches of dark red ; it is very durable, hard, crystalline, non-porous, and according to the experiments made for the Civil Government by Mr. Kirkaldy, stands a higher crushing strain than any other stone in the island. 2nd, Ghar-id-Dorf, the stone from which is white or cream-coloured, crystalline, sometimes rather open-grained, durable, hard, and, from its evenness of colour, very suitable for building. Second quality stone exists in both of the above quarries, often intermixed with the first quality. Second quality stone is also obtainable at Fex Fux, where it is brownish yellow in colour, compact, sometimes porous, and weathers well, but not so well as first quality. The principal quarries in Malta are on and about the high ground, where the lower stratum crops out at Madalena, on the edge of the great fault, and at Malak on the south coast. The following are the characteristics of some of the best kinds of first quality stone quarried in Malta :—1st, A light brown stone, fine-grained, crystalline, clean bright fracture, hard, durable, rings clearly. 2nd, A light brown stone, the same as above, but with larger grains. The best is of very even quality, but is often found rather intermixed with second quality. 3rd, A white, hard, and brittle stone, with no apparent grain, with spots and patches of softer stone intermixed, durable and non-porous. All these kinds occur at Madalena and in the adjacent quarries. 4th, A white, crystalline, somewhat porous stone, with large grains, the interstices not always filled up, but hard and durable. 5th, A white crystalline stone, the same as above, except that the grains are closer and the stone is perfectly non-porous. The last two kinds are found at Malak, on the south coast, opposite the island of Filfla.

still remained for examination. This cave is of an irregular funnel shape, and was found to contain elephants' bones and teeth, bones of aquatic birds, and of rats and dormice. The cave is in the strata of the Globigerina Limestone.

*Shantiin Fissure.*—This cave also occurs in the Globigerina Limestone, and very closely resembles that of Gandia, with which it is probably connected. In addition to the remains mentioned above, a few sharks' teeth were obtained by Dr. Caruana, who examined this fissure.

*Zebbug Cave.*—A fissure in the Globigerina Limestone is 75 feet long, 5½ feet high, with a width of from 2½ feet to a few inches. It was thoroughly examined by Spratt, who found abundant remains of elephants and other animals and birds. Adams did not explore this cave.

*Middle Cave.*—Dr. Adams discovered this cavern, which is in the Lower Coralline Limestone. The organic remains included teeth and bones of the gigantic dormouse, teeth of the Miocene shark, exuviæ of frogs of the usual size, bones of a mouse not distinguishable from those of the common meadow vole, bones of *Anseres*, and of smaller water and, perhaps, land birds, bones of fishes, and a large lot of existent land-shells. The materials among which these remains were found are various and interesting. They were found to consist of (1) white calcareous cement on the floor; (2) three feet of reddish black loam, sometimes hardened by stalagmite infiltrations; (3) three to four feet of brick-red clay, interspersed with shelves, pillars, and hardened masses of drippings, underlying a shelf of stalactite; (4) three feet of stalagmitic red earth; (5) stalactitic drippings, hermetically sealing up the opening.

*Mnaidra Gap.*—Discovered by Dr. Leith Adams in the Lower Coralline Limestone. He first found rodents and elephants' remains, and afterwards the same with those of swans and other birds, fresh-water tortoise, with recent land-shells. The greatest length of this pit or gap was found to be nearly 100 feet, with a width of from 15 to 40 feet, and a depth of 18 feet. The top was sealed with red stalagmite, under which lay white calcareous drift and portions of parent rock, overlying a shelf of stalactite, which was succeeded by a band of red clay enclosing rounded stones, some of the latter resting on a lower stalactite shelf. Then came red loam, superincumbent on a belt of yellow loam, below which was a reddish black loam, on white calcareous drippings, with a white seam on the top. No organic remains were found in the red loam or below it.

*Benhisa Gap.*—A cavity in the Globigerina Limestone, somewhat of a punchbowl shape, open towards the sea. It is full of red soil and water-worn blocks of sandstone, among which elephantine remains were found, along with skeletons of dormice, fragments of bones of large birds, bones and traces of a huge fresh-water turtle, remains of lizards, land-shells, etc.

*St. Leonard's Fissure.*—This fissure, which occurs in the Globigerina Limestone, was found to contain remains of the pigmy elephant, imbedded in grey drift and angular fragments of the parent rock.

*Melliha Cave.*—Spratt found bones and teeth of hippopotami in this cave, and Dr. Leith Adams also procured like remains in a conglomerate composed of rounded and water-worn pebbles from the parent

rock, with a paste of blue clay. This cavern appears to be situated in the Upper Coralline Limestone.

*Malak Cave* occurs in the Lower Coralline Limestone, 280 feet above sea-level. Its length has been given as about 30 feet, with a height of 4 feet. It contained an upper crust of stalactite and stalagmite, having no organic remains, passing into a grey sinter, tinged with iron, and presenting nodules and small seams of dark-brown loam. Here were found remains of existing land-shells, of the giant dormouse, and of birds, some of great size. Another band of stalagmite succeeded, covering a conglomerate composed of pebbles and clay, and containing remains of the river-horse. Dr. Leith Adams found an elephant's tooth.

The following are the animal remains found in these caves:—

*Hippopotamus pentlandi.*
*Elephas melitensis*, Falconer.
,, *falconeri*, Busk.
,, *mnaidræ*, Adams.
*Myoxus melitensis*, Falconer.
,, *cartei*, Adams.
*Arvicola pratensis*, Baillon.
*Cygnus falconeri.*

Marine Deposits off Malta.—The deposits now forming around the Maltese Islands resemble in many respects the Tertiary rocks that have just been described.[1] One specimen from Quarantine Harbour, Valetta, contained 81·57 per cent. of carbonate of calcium, consisting largely of Foraminifera, many of which are identical with those in the Tertiary rocks of the islands. In addition, this mud contained fragments of the shells of Gasteropods, Lamellibranchs, Crustacea, Echinoderms, Ostracodes, Polyzoa, a few Coccoliths, and many Corallines (calcareous algæ). Samples of the deposits from similar and rather greater depths outside the harbour were chiefly made up of calcareous algæ and large bottom-living Foraminifera. A specimen from 58 fathoms was a calcareous mud containing 73·71 per cent. of carbonate calcium, while one from 100 fathoms contained 75·84 per cent. At the latter depth the shells of pelagic species—such as Pteropods, Heteropods, *Globigerinæ*, and Coccoliths—were much more abundant than at 58 fathoms, the fragments of calcareous algæ being on the other hand less numerous and much smaller. In greater depths in the Mediterranean, the pelagic shells make up a still greater proportion of the carbonate of lime present in the deposits. The inorganic residue of these deposits consists of clayey matter, with some siliceous sponge spicules and a few diatoms, and fragments of quartz, felspars, augite, tourmaline, zircon, magnetite, and glauconite in the form of grains and casts of the Foraminifera.

The following is a list of recent Foraminifera observed in the deposits round the Maltese islands, down to a depth of 1469 fathoms:—

*Nubecularia lucifuga*, Defrance.
*Biloculina depressa*, d'Orbigny.
,, *elongata*, d'Orbigny.
*Biloculina ringens* (Lamarck).
,, sp. (?).
*Spiroloculina limbata*, d'Orbigny.

[1] Specimens of these deposits were procured for me by Surgeon David Bruce while stationed at Malta.

*Spiroloculina nitida*, d'Orbigny.
,, *grata*, Terquem (?).
,, *impressa*, Terquem.
,, *acutimargo*, Brady.
,, *excavata*, d'Orbigny.
,, sp. nov. (?).
*Miliolina macilenta*, Brady.
,, *seminulum* (Linné).
,, *oblonga* (Montagu).
,, *circularis* (Bornemann).
,, *tricarinata* (d'Orbigny).
,, *bicornis* (Walker & Jacob).
,, *reticulata* (d'Orbigny), var. (?).
,, *pulchella* (d'Orbigny).
,, *linnæana* (d'Orbigny).
,, *agglutinans* (d'Orbigny).
,, *venusta* (Karrer.)
*Articulina sulcata*, Reuss.
*Vertebralina striata*, d'Orbigny.
*Planispirina celata* (Costa).
,, *exigua*, Brady (?).
*Cornuspira involvens*, Reuss.
*Peneroplis pertusus* (Forskål).
*Orbitolites marginalis* (Lamarck).
*Haplophragmium canarieuse* (d'Orbigny).
*Placopsilina cenomana*, d'Orbigny.
*Ammodiscus incertus* (d'Orbigny).
*Textularia agglutinans*, d'Orbigny.
,, *aspera*, Brady (?).
,, *sagittula*, Defrance.
*Verneuilina spinulosa*, Reuss.
*Clavulina parisiensis*, d'Orbigny.
*Bulimina aculeata*, d'Orbigny.
,, *buchiana*, d'Orbigny.
,, *inflata*, Seguenza.
,, *subteres*, Brady.
,, *elegans*, d'Orbigny.
,, *marginata*, d'Orbigny.
,, *declivis*, Reuss.
,, *ovata*, d'Orbigny.
*Bolivina dilatata*, Reuss.
,, *textilarioides*, Reuss.
,, *punctata*, d'Orbigny.
,, *ænariensis* (Costa).
,, *robusta*, Brady.
*Cassidulina lævigata*, d'Orbigny.
,, *crassa*, d'Orbigny.
,, *bradyi*, Norman.
,, *subglobosa*, Brady.
*Lagena quadricostulata*, Reuss.
,, *clathrata*, Brady.
,, *acuticosta*, Reuss.
*Lagena lævis* (Montagu).
*Nodosaria scalaris* (Batsch).
,, *communis*, d'Orbigny.
,, *consobrina*, d'Orbigny.
,, *vertebralis* (Batsch).
,, *raphanus* (Linné).
,, *obliqua* (Linné).
,, *pyrula*, d'Orbigny.
*Rhabdogonium tricarinatum* (d'Orbigny).
*Cristellaria cultrata* (Montfort).
,, *gibba*, d'Orbigny.
,, *orbicularis* (d'Orbigny).
*Polymorphina gibba*, d'Orbigny.
,, *lactea* (Walker & Jacob).
*Uvigerina pygmæa*, d'Orbigny.
,, *angulosa*, Williamson.
,, sp. (?).
*Globigerina æquilateralis*, Brady.
,, *inflata*, d'Orbigny.
,, *rubra*, d'Orbigny.
,, *bulloides*, d'Orbigny.
,, *sacculifera*, Brady.
*Orbulina universa*, d'Orbigny.
*Pullenia* sp. (?).
*Sphæroidina bulloides*, d'Orbigny.
*Spirillina vivipara*, Ehrenberg.
*Patellina corrugata*, Williamson.
*Discorbina globularis* (d'Orbigny).
,, ,, (?), var. (?).
,, *orbicularis* (Terquem) (?).
,, *vilardeboana* (d'Orbigny).
,, *rarescens*, Brady.
,, *rosacea* (d'Orbigny).
*Planorbulina aceroalis*, Brady.
,, *mediterranensis*, d'Orbigny.
*Truncatulina lobatula* (Walker & Jacob).
,, *variabilis*, d'Orbigny.
*Pulvinulina elegans* (d'Orbigny).
,, *micheliniana* (d'Orbigny).
,, *auricula* (Fichtel & Moll).
*Rotalia beccarii* (Linné).
,, *schroeteriana*, Parker & Jones.
,, *orbicularis*, d'Orbigny.
,, sp. (?).
*Polytrema miniaceum* (Linné).
*Nonionina umbilicatula* (Montagu).
,, *boueana*, d'Orbigny.
,, *stelligera*, d'Orbigny.
*Polystomella crispa* (Linné).
,, *macella* (Fichtel & Moll).
,, *striatopunctata* (Fichtel & Moll).

On making a comparison of this list with the previous lists, it will be seen that of the 103 well-defined species of living Foraminifera in the

Malta seas, 16 are found fossil in the Upper Coralline Limestone, 17 in the Greensand, 37 in the Blue Clay, 20 in the Globigerina Limestone, and 2 in the Lower Coralline Limestone. Again, in the foregoing lists of Foraminifera observed in the Tertiary rocks of Malta, there are 137 well-defined species; and of these 54, or nearly 40 per cent., are now to be found living in the neighbouring seas. A more extensive examination of the rocks and the marine deposits will certainly result in large additions to the above lists, and to a larger percentage of species common to these Tertiary rocks and the marine deposits now in process of formation. It would be very interesting to make similar comparisons in other groups, but the materials are not at present available.

Origin of the Rocks and Soils.—The Tertiary rocks of Malta are of marine origin, and a careful examination of their fossil remains and inorganic constituents shows that they have all been laid down along a continental coast-line, but at very different depths and distances from the shore. During the time of their formation the coast-line evidently underwent a large oscillation of depression and elevation, and the physical conditions of the ocean, over the site of the present Maltese Islands, was, during the same period, subject to considerable changes. That continental land could not have been far distant while these rocks were forming on the floor of the ocean is shown by the presence of river detritus of a blue colour, and the greater or less abundance in all the rocks of fragments of quartz, tourmaline, glauconite, and other minerals; the small size, however, of these transported mineral fragments shows that none of the beds could have been laid down quite close to the shore or to the mouth of a river.

The Lower Coralline Limestone, although semicrystalline, is chiefly composed of the remains of calcareous Algae, and large thick-shelled Echinoderms, Molluscs, Crustacea, Foraminifera, and other animals that flourished in shallow water, in depths of 5, 10, or 30 fathoms. All these organisms lived on or attached to the bottom of the sea. From the small amount of detrital matter, the small number of transported particles, as well as from the nature of the organisms, these rocks must have been laid down on banks that were bathed by currrents coming directly from the open ocean, and yet only a few traces of pelagic organisms can be observed in the microscopic sections of the rock. The same thing obtains on shallow banks in the present oceans.

These shallow banks commenced subsequently to sink, and the Lower Coralline Limestone of Malta became covered over by beds indicative of deeper water: in the first instance by deposits composed of the broken fragments of shallow-water organisms, with an admixture of pelagic shells, and later on by deposits consisting almost wholly of the shells of *Globigerinæ*, Pteropods, Coccoliths, Coccospheres, and Rhabdoliths, organisms that lived in the surface waters of the ocean, but whose dead shells fell to the bottom, and there accumulated. Some of the middle and lower beds of the Globigerina Limestone appear to have formed in depths approaching 1000 fathoms. The fossil remains of fishes, Corals, Echinoderms, and Molluscs, as well as the great abundance of pelagic shells,

likewise indicate the deep-water character of the Globigerina Limestone. I estimate that not more than six to eight per cent. of the carbonate of lime in these deposits is due to the remains of organisms that lived on the bottom of the ocean. The whole of these Globigerina rocks were of a blue colour when at the bottom of the sea—the same as the great majority of terrigenous deposits in existing oceans—the present red colour of the more calcareous beds being due to oxidation subsequent to elevation.

During the formation of the upper beds of the Globigerina Limestone an elevation of the sea-bottom commenced, the shore approached the site of the present Maltese Islands, there was a gradual, though fluctuating, increase of river detritus in the deposits, and the oceanic currents that passed over the spot became slowly mixed up with and replaced by currents containing a large quantity of river-water; these combined influences finally led to the formation of the Blue Clay that caps the Globigerina series of rocks. In still shallower water a Greensand was formed, in almost all respects similar to that now in process of formation on the Agulhas Banks, off the Cape of Good Hope, in depths from 40 to 200 fathoms. In modern seas glauconitic deposits are not met with in the central parts of the great ocean basins, nor where a rapid accumulation of river detritus is going on, but rather on continental banks swept by waves and by currents. Assuming the same distribution to have obtained in ancient seas we can form some idea of the geographical position of the Malta Greensand with reference to the adjacent Tertiary continent.

The Upper Coralline Limestone overlies the Greensand, and is a shallow-water deposit in all essential particulars resembling the Lower Coralline Limestone at the base of the series. It contains the same mineral particles, many of the same organisms, and was evidently formed under very similar conditions.

It would appear then, that the diversity observed in the various Maltese rocks is to be referred rather to the depth of sea and distance from land at which they were formed than to difference in time. It is evident that rocks which are now horizontal, and placed vertically one above the other, could not have been formed at the same time, but all the varieties of Maltese rocks could quite well have been forming along a coast line at one and the same time over an area of less than 20 miles square; some of the clay and greensand layers in Gozo may have been formed inshore at the same time that the upper layers of the Globigerina Limestone at Marsa Scirocco in Malta were being laid down in deep water seawards. At a not very distant but more stable part of the same coast line a coralline limestone may have been continuously in process of formation during the whole period represented by the Tertiary rocks of Malta; it may have been continuous on the one hand with the Lower Coralline Limestone, and on the other with the Upper Coralline Limestone, and contemporaneous also with the intervening greensand, clay and Globigerina Limestone. There must necessarily have been a great lapse of time between the formation of the Upper and Lower Coralline Limestones of the present Maltese islands, and in the interval many of the shallow-water organisms may have died out and have been replaced by

others, but differences produced in this way in the character of the rocks would be much less than differences dependent on the depths at which the rocks were deposited.

The rounded nodules arranged in patches or extended beds at different horizons throughout the Globigerina limestones have generally been described as rolled pebbles, and consequently indicative of shallow water.[1] This interpretation cannot now be admitted. These nodules are all phosphatic, and in the nodule beds are associated with the casts of corals, shells, echinoderms, and fish remains, that likewise contain a large quantity of phosphate of lime. Except in the quantity of phosphates they contain these rounded nodules differ but little from the matrix in which they are imbedded. Their microscopic structure is often identical with that of the surrounding Globigerina Limestone, and they all contain the remains of the same pelagic organisms. Off the Cape of Good Hope the *Challenger* Expedition dredged from depths of 150 to 1900 fathoms many phosphatic nodules, almost the same in general appearance, chemical composition, and microscopic structure as those found in the Greensand and Globigerina rocks of Malta. Although the cause which led to the formation of these nodules may be obscure, there can be no doubt they were formed, and are now forming, at the bottom of the sea, especially along the continental slopes.[2] In the form of minute nodules, or casts of the pelagic Foraminifera, phosphates are sparingly distributed throughout the whole of the Globigerina and Greensand rocks, and there can be but little doubt that these phosphates are derived from the bodies of marine animals. It seems necessary however to call in some special or even abnormal conditions to account for the origin and great accumulation of phosphates in those nodule beds distributed at definite horizons throughout the whole horizontal extent of the formations. The recent deep-sea dredgings and trawlings seem to show that on certain areas of the sea-bed the animals are crowded together in great numbers, while adjacent regions are relatively barren; the nodule beds may represent the position of such fertile or prolific patches. But this explanation does not appear sufficient for the sharply marked and widely extended nodule beds; these probably represent periods of disturbance either on the neighbouring continent, or in the ocean, or both. The emission of gases from submarine volcanoes, or an abnormal outflow of river water from the land, frequently kills large numbers of pelagic creatures, and their dead bodies may at such times form a vast layer on the bottom. The phosphate of ammonia thus arising would, in the deposits in process of formation, be decomposed in the presence of carbonate of lime, giving rise to phosphate of lime and alkaline carbonates. The former, being insoluble, would accumulate by pseudomorphism and mechanically in nodular form in the deposits accumulating on the sea floor.

It is to be remarked that in the nodule beds the fossil remains are

[1] Leith Adams, *Nile Valley and Maltese Islands*, p. 127.

[2] *Narr. Chall. Exp.* vol. i. pp. 289 and 806; Murray, Bull. Mus. Comp. Zool., vol. xii. p. 52.

more abundant than in the other layers; these are for the most part present in the form of phosphatic casts of the shells, corals, and other organisms, the carbonate of lime shells themselves having disappeared. These animals were in all likelihood present on the bottom when the layers that now contain no trace of them were being laid down, but their thin and delicate shells were removed from the bottom by solution, as now takes place in modern deep-sea deposits.[1] Had the deposition of these phosphates not taken place at the time of the accumulation of the deposits on the sea-floor we might never have known of the presence of many deep sea and pelagic animals in these ancient seas. The teeth of sharks are relatively abundant in all the Malta rocks, with the exception

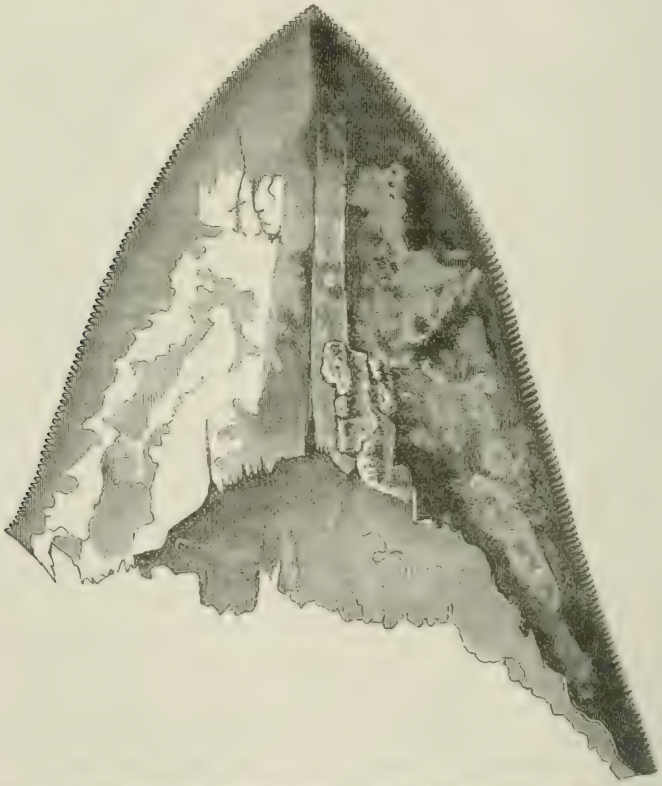

Fig. 1.—Tooth of *Carcharodon megalodon*, from 2385 fathoms in Central Pacific (Natural Size).

of the Upper and Lower Coralline Limestones, but they are much more abundant in the nodule beds than elsewhere, and this appears to point to the death of a large number of these animals at the time of the formation of the nodule beds, and therefore to some unusual disturbance

[1] Murray and Irvine: on Coral Reefs and other Carbonate of Lime Formations in Modern Seas; *Proc. Roy. Soc. Edin.* vol. xvii. p. 83, 1890.

in the ocean. The hard dentine or enamel of these teeth apparently withstands the solvent power of sea-water longer than the remains of most pelagic animals, so that it is unlikely many of them were dissolved away from the layers intermediate between the nodule beds. In the central regions of the Pacific the *Challenger* dredged more than 1500 sharks' teeth in one haul.[1] Some of these were identical with those found

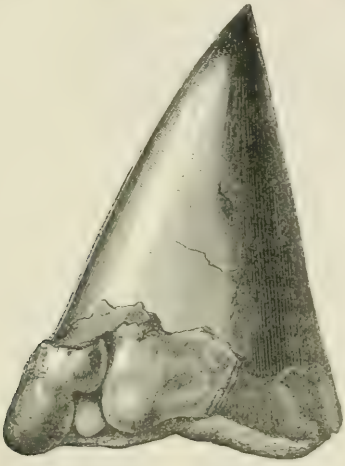

Fig. 2.—Tooth of *Oxyrhina trigonodon*, from 2350 fathoms in Central Pacific (Natural Size).

in the Malta rocks, as will be seen from the accompanying figures. The base and internal portions have, however, been entirely dissolved away, whereas these parts are preserved in the Malta specimens through the deposition of phosphates. One specimen was dredged in the bed of the Gulf Stream by Agassiz in the same condition as presented by the Malta specimens.

During the whole period of their formation, the Tertiary beds of Malta do not appear to have been above water, for we find no reliable trace of land surfaces. Some time after the formation of the Upper Coralline Limestone, however, the Mediterranean region underwent many great and probably sudden changes; the sea-bed, of which the Maltese rocks formed a part, was raised into a wide extent of dry land uniting the continents of Europe and Africa, and in all likelihood extending in the directions of the shallow banks delineated on the accompanying map. This land was covered with a varied and extensive flora, while herds of gigantic and pigmy elephants, hippopotami, ruminants, and carnivora, large dormice, large swans, fresh-water tortoises, and huge lizards found a home in its forests and rivers. All this extensive land surface has disappeared through subterranean movements and the disintegrating action of sea, wind, and rain, with the exception of the small Maltese islands, which, however, have retained in the diluvium of their caves the relics of a great continental land.

[1] *Narr. Chall. Exp.* vol. i. p. 809.

"The geologist, standing on the bare limestone cliff, and looking across the deep blue waters of the Mediterranean, might speculate on a time when Malta was portion of a continent extending far beyond the misty horizon,—of a land abounding with mountains, rivers, lakes, woods and forests, where strange pigmy elephants kept company with gigantic compeers, and where also river-horses in hundreds and thousands lived and died; of myriads of destructive rodents, huge fresh-water tortoises, and aquatic birds swarmed on the land or on the water; how, perchance, for unreckoned ages all had sojourned in safety on this ancient Post-Miocene land, until suddenly (it may be by degrees) it began to sink below them, and they were finally cut off from both continents; then, dying by starvation, they crowded together, and as pinnacle after pinnacle of rock was disappearing under the waves, boisterous billows washed their carcases into the hollows and rock fissures where we now find them."[1]

The quaternary deposits met with in caves, fissures, and some ravines, contain a few black rolled limestone pebbles which have not been derived from any of the existing Maltese rocks, and may therefore have been transported from the now-submerged land. But, on the whole, these quaternary clays as well as the soils of Malta have been derived from the disintegration and decomposition of the underlying Tertiary rocks, or precisely similar rocks that have now disappeared beneath the waves. Even the rocks that contain the highest percentage of carbonate of lime yield a small residue, more or less insoluble, composed of clayey matter, minute mineral particles and oxides of iron and manganese, which remains behind to form soil on the removal of the carbonate of lime in solution. This residue increases as the percentage of carbonate of lime decreases in the rocks; hence the soils are deeper on the outcrops of the Greensand, Clay, and Globigerina rocks than on the Upper and Lower Coralline Limestones. All the Malta soils are, however, largely made up of the broken and comminuted fragments of the calcareous rocks themselves, and as these, especially the Greensands, Clays, and Globigerina layers, contain phosphate of lime and alkalies, these substances, on the partial decomposition of the rock fragments with every shower of rain, are set free in the fields in a form suitable for absorption by the growing crop. In this way as the disintegration and denudation of the islands goes on through natural processes, the soil is being continually renewed and fertilised, and the islanders are therefore enabled to take two or three crops from the fields annually, without any extensive and continued system of manuring. It has been shown that the nodule beds are all phosphatic, some of the nodules containing a larger percentage than is shown in the foregoing analysis; the glauconitic nodules and casts of the Greensand are also rich in the same substance. Were the islanders to take the phosphatic nodules and casts from the Globigerina, Greensand, and Lower Limestone beds, break them up or crush them, and spread them on their fields, their labour would certainly be rewarded by more abundant harvests.

[1] Leith Adams, *l.c.*, p. 146.

It is thus possible, from a microscopic study of the different layers of Maltese rocks, to obtain a glimpse of the geographical distribution of land and water in this part of the Mediterranean region during the Tertiary period, and in some measure to connect the present fertility and prosperity of the Maltese islands with the functional activity of the marine animals that flourished in the surface waters of the ocean in bygone ages.

I have merely attempted to give a sketch of the geology of the Maltese islands. The microscopic sections that have been examined show that every layer is worthy of more careful study and detailed description. This is a field of research that might well appeal to the native Maltese. It is a pity that so many of the more valuable fossils have been taken away to foreign countries, and that no systematic attempt is being made to form, either in the university or in the public museum, a collection illustrative of the geology and palæontology of this group of islands. A complete series of the fossils from each bed so arranged as to permit of comparison would be an extremely valuable possession for Valetta. The study of such a collection, together with the petrographical characters of the various beds, and in connection with the results of recent deep-sea investigations, would certainly lead to valuable discoveries interesting to all scientific men, and would greatly redound to the honour of the Maltese people.[1]

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[1] I have to acknowledge the assistance of Mr. Frederick Pearcey in mounting and determining the Foraminifera, of Mr. James Ross in making the analyses, and of Messrs. James Chumley and John Gunn in other work in connection with the preparation of this paper.

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Some interesting information about the so-called "imported earth" will be found in a small pamphlet on Malta, by Mr. Zammit.

### Explanation of the Plates.

The reference letters in the plates have the following signification :—

a, *Globigerina* : b, *Orbulina* : c, *Rotalia* ; d, *Pulvinulina* ; e, *Alveolina* ; f, *Truncatulina* ; g, *Textularia* ; h, *Planorbulina* ; i, *Biloculina* ; j, *Miliolina* ; k, *Carpenteria* ; l, *Nummulites* : m, *Heterostegina* ; *n*, Calcareous Algæ ; *o*, Mollusc shells ; *p*, Polyzoa ; *q*, Echini spines ; *r*, Ostracode valves ; *s*, Corals ; *t*, Glauconite. Hartnak's No. 4 objective was used in making the drawings.

## GEOGRAPHICAL NOTES.

### ASIA.

**The Merv Oasis.**—After the annexation of Merv, a part of that territory, comprising about 386 square miles, was formed into a private estate for the Emperor of Russia. It lies twenty-eight miles from the town of Merv and near the railway station of Baïram-Ali. About forty miles from this station an immense dam has nearly been completed to check the waters of the Murgab, which will be used for the irrigation of the property. Next spring, when the irrigation canals have been constructed, a fifth of the estate will be colonized. For this purpose Mohammedan settlers from Ferghana will be chosen, these being best able to endure the dry and hot climate of the Merv oasis, where the thermometer often stands in summer as high as 112° to 120° F.—*Deutsche Rundschau*, Bd. xii. Heft 11.

**Java.**—The Italian Consul at Batavia, in a report to his Government (*Boll. del Ministero degli Affari Esteri*, vol. i. fasc. 5) describes the trade and industry of Java as being in a very unsatisfactory condition. The island is undoubtedly the most important part of the Dutch East Indies. Its area, indeed (about 51,300 square miles), is little more than one-twelfth of the total area of those possessions, but it contains a native population of 22,139,624 souls, or over three-and-a-half times the population of all the other Dutch islands taken together. The natives are weighed down by excessive taxation, and their principal occupation, the cultivation of rice, does not bring in enough to pay their taxes and provide them with means of subsistence. The production of coffee has decreased owing to the devastations of the *Hemileia vastatrix*, and sugar has suffered equally from a disease known as *serah*. How much the failure of these principal crops has impoverished the people may be judged from the fact, that, last year, gold to the value of about £80,000 was sent from the inland provinces to Batavia, being obtained by the melting down of ornaments. Notwithstanding this melancholy state of things, the Italian Consul, M. Landberg, looks forward to a more prosperous future. The great want is capital to develop new forms of industry. It must also be remembered that the country is still suffering from the effects of the commercial crisis of 1884. (Compare the admirable series of papers by the late Emil Metzger, published in Volume iv. of our Magazine.)

### AFRICA.

**A Convention between Britain and France** has been concluded in regard to their territorial interests in Africa. France, by becoming a party to the recent Anglo-German Agreement, advances her sphere of influence in North-West Africa from her colonies on the Mediterranean to those in Senegambia, thus securing the unity of her territorial possessions in that part of Africa. The frontier between the

FIG. 1 UPPER CORALLINE LIMESTONE.

FIG 2. LOWER CORALLINE LIMESTONE.

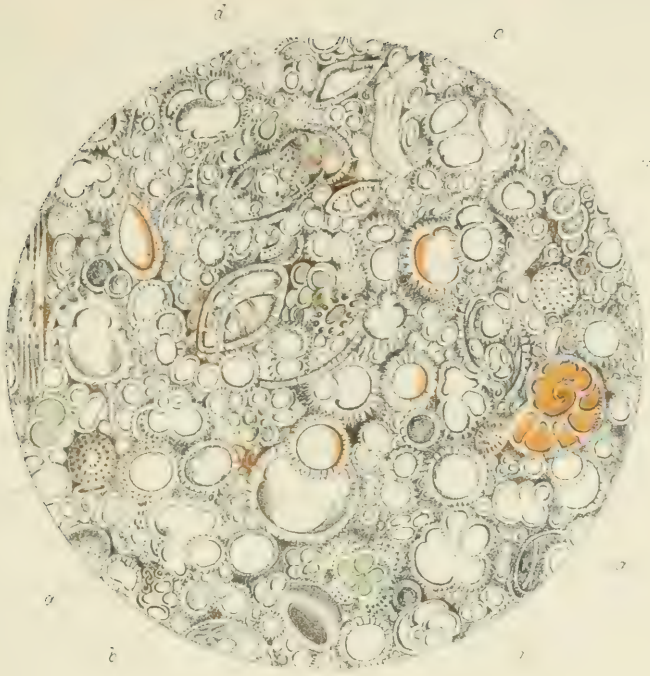

FIG. 1 GLOBIGERINA LIMESTONE.

FIG. 2 GREENSAND.

British and French possessions on the Niger has yet to be determined; but it is understood to run approximately between Say, on the Niger, and Barruwa, on Lake Tsad, and in such a manner as to leave Sokoto and its dependencies within the British sphere. France is thus in a position to secure the trade of the Upper Niger and beyond, and also to dominate the caravan traffic across the desert.

**Anglo-Portuguese Convention.**—The rival claims of Great Britain and Portugal in Southern Africa, the discussion of which has dragged on for several years, have been finally adjusted. By a convention concluded last month, Great Britain secures in the main the recognition of her claims, whilst the historic pretensions of Portugal have been virtually admitted and given effect to within a limited, even generous, area. We shall take an early occasion to refer to the precise boundaries that have been laid down. In the meantime it is sufficient to point out that, by the terms of the Convention, the British sphere of influence in South Africa has obtained ample room for expansion northwards, beyond the Zambezi, up to the confines of the Congo Independent State and German East Africa, and including Nyassaland (on the western shores of the lake) and the Shiré Highlands. The Portuguese spheres of influence, both on the East and West Coasts, have, in like manner, been extended into the Interior. Between two points on the Zambezi, which flows through the British sphere, the principle of free transit of goods, laid down in the Berlin Act of 1885, has been applied in favour of Portugal, while reciprocal rights have been retained by Britain at a point in the Portuguese sphere. The Zambezi itself, like the Congo and Niger, has been declared free to the flags of all nations.

**Anti-Slavery Conference, Brussels (1889-90).**—The labours of the Brussels Conference have been concluded. We note with gratification some of the more important enactments. The following excerpts and abstracts have been taken from the General Act:—

Article I. declares that the most effective means for counteracting the Slave Trade in the interior of Africa are the following:—"(1) Progressive organisation of the administrative, judicial, religious, and military services in the African territories placed under the sovereignty or protectorate of the civilised nations. (2) The gradual establishment in the interior by the Powers to which the territories are subject of strongly occupied stations, in such a way as to make their protective or repressive action effectively felt in the territories devastated by slave-hunting. (3) The construction of roads, and, in particular, of railways, connecting the advanced stations with the coast, and permitting easy access to the inland waters, and to such of the upper courses of the rivers and streams as are broken by rapids and cataracts, in view of substituting economical and rapid means of transport for the present means of carriage by men. (4) Establishment of steamboats on the inland navigable waters and on the lakes, supported by fortified posts established on the banks. (5) Establishment of telegraphic lines, ensuring the communications of the posts and stations with the coast and with the administrative centres. (6) Organisation of expeditions and flying columns, to keep up the communication of the stations with each other and with the coast, to support repressive action, and to ensure the security of high roads. (7) Restriction of the importation of fire-arms, at least of modern pattern, and of ammunition throughout the entire extent of the territories infected by the Slave Trade."

These general measures are in accordance with the views of all authoritative writers on the subject; but to carry them into effect must be the work of time. Provision is therefore made for the present urgent need of restrictive measures.

The stations, the inland cruisers organised by each Power in its waters, and

the ports which serve as ports of register for them shall (Article II.), independently of their principal task, which is to prevent the capture of slaves and watch the routes of the Slave Trade, have certain subsidiary duties :—

"(1) To support and, if necessary, to serve as a refuge for the native populations, whether placed under the sovereignty or the protectorate of the State to which the station is subject or independent ; and temporarily for all other natives in case of imminent danger : to place the populations of the first of these categories in a position to co-operate for their own defence : to diminish inland wars between tribes by means of arbitration : to initiate them in agricultural works and in the industrial arts so as to increase their welfare ; to raise them to civilisation and bring about the extinction of barbarous customs, such as cannibalism and human sacrifices. (2) To give aid and protection to commercial undertakings ; to watch over their legality by controlling especially contracts of service with natives, and to lead up to the foundation of permanent centres of cultivation and of commercial establishments. (3) To protect, without distinction of creed, the Missions which are already or about to be established. (4) To provide for the sanitary service, and to grant hospitality and help to explorers, and to all who take part in Africa in the work of repressing the Slave Trade."

The extreme—and certainly the most effective—measure of declaring the Slave Trade an act of piracy or brigandage has been avoided ; but the following excellent enactment (Article V.) has been made :—

"The Contracting Powers undertake, unless this has already been provided for by their laws in accordance with the spirit of the present Article, to enact or propose to their respective Legislatures in the course of one year at latest from the date of the signature of the present General Act a Law for rendering applicable, on the one hand, the provisions of their penal laws concerning the graver offences against the person, to the organisers and abettors of slave-hunting, to perpetrators of the mutilation of adults and male infants, and to all persons who may take part in the capture of slaves by violence ; and, on the other hand, the provisions relating to offences against individual liberty, to carriers, transporters, and dealers in slaves.

"The associates and accessories of the different categories of slave captors and dealers above specified shall be punished with penalties proportionate to those incurred by the principals."

Article VII. accords the right of asylum :—

"Any fugitive slave claiming on the continent the protection of a Signatory Power shall obtain it, and shall be received in the camps and stations officially established by such Power, or on board the vessels of such Power plying on the lakes and rivers. Private stations and boats are only permitted to exercise the right of asylum subject to the previous sanction of such Power."

Restrictive measures against the trade in fire-arms and ammunition, and especially against rifles and improved weapons, are to be taken within the territories comprised between 20° N. lat. and 22° S. lat., including the islands adjacent to the coast as far as 100 nautical miles from the shore. These measures, however, provide for all legalised persons obtaining such arms and ammunition as are necessary for their wants and protection.

Chapter II. deals with caravan routes and the land transport of slaves, and provides for certain protective measures.

Chapter III. deals with general provisions for the repression of the sea-borne Slave Trade, and Article XXI. specifies the sphere of its operations :—

"This zone extends, on the one hand, between the coasts of the Indian Ocean (those of the Persian Gulf and of the Red Sea included) from Beloochistan to

Cape Tangalane (Quilimane); and, on the other hand, a conventional line which first follows the meridian from Tangalane till it meets the 26th degree of south latitude; it is then merged in this parallel, then passes round the island of Madagascar by the east, keeping 20 miles off the east and north shore, till it crosses the meridian at Cape Ambre. From this point the limit of the zone is determined by an oblique line which extends to the coast of Beloochistan, passing 20 miles off Cape Ras-el-Had." It will be observed that this somewhat ungeographical definition leaves the island of Réunion outside the sphere of operations.

One of the most effective means for the repression of the maritime Slave Trade being what is known as the reciprocal "right of search," it is natural that the Conference should have dealt comprehensively with this and analogous measures, such as the granting of the national flag. Conventions granting the reciprocal right of visit, of search, and of capture, had previously been concluded between the Great Powers, with the exception of France. France has persistently refused to be a party to this action, and in consequence her national flag has been abused. Although ostensibly maintaining her position in this respect at the Conference, France has now agreed to increased restrictions in regard to the granting of her flag, which may have the effect of preventing its abuse.

Within the zone previously referred to as subject to the operations against the trade in arms and munitions, certain restrictive measures are to be applied in regard to the importation of distilled liquors. Those regions which have hitherto escaped from the pernicious traffic are to be permitted to enjoy continued immunity. In the remaining regions, where the traffic occurs, alcoholic liquors will be taxed with an import duty of 15fr. per hectolitre (about 1½d. per quart) for three years. "At the expiration of this period the duty may be increased to 25fr. during a fresh period of three years." At the end of the sixth year an attempt will be made to fix a minimum duty throughout the whole extent of the prescribed zone. Excise duties will also be enforced, where possible.

The General Act is to be ratified as soon as possible, one year being given as the extreme limit of time.

It is obvious that the important enactments of this Conference, even if partially operative in Africa, cannot fail to produce beneficial results in the development of Africa. The greatest credit is due to the Signatory Powers and their representatives at the Conference. The recent edict issued by the Sultan of Zanzibar against the *status* of slavery may also be regarded as gratifying and hopeful, in spite of former experiences.

**Dr. Peters** has returned to Europe after performing a very remarkable expedition in East Africa. His name and his deeds have of late been so much before the public that it is unnecessary to describe his experiences in any detail. He who was given up as lost, and was universally lamented in obituary notices, has now returned home, as vigorous as ever, and quite prepared to continue his career as a pioneer of German colonisation in Africa.

A few general particulars may be given. He left Witu last July, and proceeded up the river Tana to the neighbourhood of Kenia. Lake Baringo was reached on January 7th, 1890, and Kavirondo at the end of the month. By the early part of February he was only six days' march from Emin Pasha's first station, where he learnt from the Waganda that the Pasha, to whose relief he had ostensibly set out, had departed in the train of Mr. Stanley. Nevertheless, Dr. Peters continued his journey westwards until the native information he had received in regard to Emin Pasha was confirmed by a letter from Mr. Stanley, which he intercepted

and opened. He proceeded to Uganda, where he remained a short time, and eventually to Ugogo and M'pwapwa. On his arrival at M'pwapwa on 19th June he met Emin Pasha. On 16th July he reached Bagamoyo. Owing to the smallness of his caravan and the hostility of the natives, Dr. Peters had to fight his way step by step for the greater part of his journey. His privations and dangers were extreme; but he survived them all. It will be a disappointment to him, no doubt, that, in consequence of the recent Anglo-German Agreement, the bundle of treaties he brought back will now be valueless.

## AMERICA.

**The Eskimo of Alaska.**—The *Circular of Information*, No. 2, 1890, issued by the United States Bureau of Education, consists of an Eskimo vocabulary preceded by a short account of the tribes in Alaska. The principal tribes are the Kaveas, whose original home was the country near the lakes, east of Port Clarence, but is now almost depopulated owing to the scarcity of game, the remnant of the tribe being scattered over the whole of Arctic Alaska; the Tigaras, who inhabit Point Hope and the adjoining hills; the Kinegans of Cape Prince of Wales. Each of these tribes has in its turn exercised extensive sway, and now the Nuatoks, who inhabit the interior from the Arctic Ocean, east of Point Barrow, to Kotzebue Sound, are in the ascendant and threaten to overrun the whole country. There are also settlements of Eskimo in Siberia, at Plover Bay, Cape Tchaplin, and East Cape, though the Asiatic Eskimo have to a great extent been crowded out or absorbed by the Deermen (Tchuktches?). Asia is commonly supposed to be the original habitat of the Eskimo, though Dr. H. Rink, in a paper read before the Anthropological Institute (*Journal*, May 1890), endeavoured to show, from the gradual change of customs, language, form of boats, etc. to the east and west of Alaska, that the latter country must have been the cradle of the race. In the discussion which followed, however, Dr. J. Rae upheld the generally accepted theory, asserting that in appearance the Eskimo are Asiatic, or, at any rate, not American, and maintaining that they adapted their habits to the country in which they lived. Three types are observable in Alaska; the tall, cadaverous natives of Kotzebue Sound, who live on fish, ptarmigans, and marmots; the strong, gigantic race of the Nuatoks, vigorous and courageous, who live on reindeer, mountain sheep, and fish; and a short, stumpy type, now found on the Arctic coast. These are probably the original Eskimo, free from any admixture of southern tribes. They live on whale, seal, and venison. The Eskimo have coarse black hair, and broad, flat noses. The males have the lower lip pierced to receive labrets. These are made of agate, when the wearer can procure such, but the poorer natives have to content themselves with cannel-coal, ivory, gravel, or glass stoppers obtained from ships. Men who have distinguished themselves in whale-hunting tattoo their cheeks. The women wear ivory earrings, carved or set in turquoise, and some have a chain of beads suspended under the chin from one ear to the other. The dress of the men consists of knee-breeches, a loosely-fitting cloak with a hood of wolf or wolverine skin, a pair of stockings, and half-boots with seal-skin soles. In winter two suits are worn, the inner one with the hair next the body. Each tribe has some peculiarity in the trimming of the dress. The women have their boots, stockings, and pantaloons all in one garment, and their cloaks have a fulness at the back to hold an infant. The manufacture of these garments is the chief employment of the women in winter. They dry and scrape the skin and sprinkle it with chalk, which renders it soft and white. The best hands can prepare two reindeer skins for ordinary purposes in twelve hours. Sometimes the skins are dyed brown

with a decoction of alder bark. The Eskimo used to catch reindeer in snares of raw hide or in corrals of brushwood, or chase them with dogs, but now most of them are provided with rifles. They spear seals when they put their heads up through the blow-holes in the ice, or take them in nets suspended under the holes. Whales they kill with harpoons to which lines of walrus hide are attached, with three air-bags tied to them. Small birds are caught with nooses, and larger ones are brought down by ivory balls tied together with sinews, which wind round the necks of the birds when the balls are thrown into a flock. The coast natives live in underground houses during the winter, but in summer wander over their hunting-grounds, living in tents. The Nuatoks live in huts of spruce poles, covered with reindeer skins, until the end of May, when the snow begins to melt. The open boats (*umiaks*) have a framework of spruce covered with sea-lion or walrus skin, or, if these be not attainable, white grampus skin. Those of Kotzebue Sound are the largest, being 35 feet long and 6 feet wide. They will carry 20 persons and 1000 pounds of freight. The Eskimo are intelligent, and are quick in devising ways and means in cases of emergency. They are proverbially honest and truthful, but in many respects their morality is of a very low standard. Their conduct is guided solely by selfishness, and they never part with anything, or do any service, without a prospect of immediate remuneration. They treat their wives with such brutality as sometimes to drive them to suicide, and sometimes they kill them with their own hands. Polygamy is hereditary, a son taking as many wives as his father, without regard to his ability to keep them. The Eskimo are extremely superstitious. They believe in ghosts and in the transmigration of souls. Eclipses of the moon cause great consternation. The medicine-men (*unukuts*) howl and drum until it is passed. These men are divided into seven grades. Those of the seventh grade are supposed to be immortal, and their knowledge is said to extend beyond the world into the spirit-life. They practise all kinds of conjuring tricks, and are employed to drive away sickness by their incantations.

**Uruguay.**—The *Bulletin de la Soc. R. Belge de Géogr.*, No. 3, 1890, gives some statistics relating to this republic. The area is 70,168 sq. miles. As for the population no certain data can be obtained, for no census has been taken since 1860, when the number of inhabitants was 229,480. Estimates give the number in 1887 as 614,257, but the director of the statistical bureau at Montevideo considers that 651,112 is nearer the truth, notices of births, etc. being often omitted. The total number of immigrants from 1867 to 1888 was 288,791, or 13,127 a year. Uruguay is divided into nineteen departments, of which the most populous is that of Montevideo, where there are 185,211 inhabitants on an area of only 258 sq. miles, or about 716 to the square mile. The largest department is Tacuarembo, with an area of 8116 sq. miles. As in the Argentine Republic, the riches of Uruguay consist principally of horses and cattle. In 1889 there were in the republic 8,339,400 head of cattle, 22,989,600 sheep, and 590,000 horses, besides considerable numbers of goats, pigs, asses and mules. The mineral riches of the country are important, but are not much worked at present. Cereals, vegetables, and tobacco are the crops principally cultivated. There are four lines of railway in the country, having a total length of 378 miles.

**The Chaco.**—A narrative of the journey of M. de Brettes through the Gran Chaco, announced in the *Scot. Geogr. Magazine*, vol. iv. p. 164, has been published in the *Bulletin de la Soc. Languedocienne de Géographie*, 1ère Trim. 1890. The character of this vast unexplored region has been described in the *Scot. Geogr. Magazine*, vol. iii. p. 487, and M. de Thouar's endeavour to find a practicable

route across it from Bolivia to the river Parana was noticed in vol. iv. p. 667. M. de Brettes started from Apa, at the confluence of the river of the same name with the Parana, and traversed the Chaco as far as a point lying in lat 21° 55′ S. and long. 61° 20′ 51″ W. He was accompanied by fifty Indians and a Paraguayan attendant, and received great assistance from Indians of the Guana tribe, which was the first he met with. His Indian escort deserted, a few at a time, until, on entering the territory of the Banghi, enemies of the Guanas, he was left with only Ayala, the Paraguayan. The country became more and more arid, water being obtained only from pits dug by the Indians near the sheds in which they live. At length Ayala also, frightened at the scarcity of water and provisions, turned back, and left M. de Brettes alone to face the hardships of the journey. The latter, after suffering greatly from want of water and being attacked by Indians, was kindly received by natives of the Akssek tribe, and on Nov. 1st, nineteen days after leaving Apa, he reached the frontier of Bolivia. A few days later he turned back at the point already mentioned. As he advanced westwards the water became more and more scarce, though the vegetation was superb. M. de Brettes considers that the object of his journey, namely, to find a practicable route between Bolivia and the Paraguay, has been attained. He believes that goods might be brought by this route from Tarija to Apa, water being provided by digging pits along the track. The distance from Tarija to Buenos Ayres is about 1250 miles, but for 880 miles merchandise would be conveyed by water along the rivers Paraguay and Parana. The Indians, belonging to the four great tribes of the Guanas, Khamanaghas, Neenssemakas and Aksseks, M. de Brettes estimates at 50,000. They cultivate maize, manioc, and potatoes, and keep domestic animals. Several families live together in a *toldo*, or shed, 50 to 100 yards long and open at one side. The walls are formed of branches and the roof of reeds and straw, which hang down to the ground, forming a screen through which the inmates can watch the approach of strangers without being themselves observed. When any one dies in a *toldo*, the occupants burn it and settle on another spot. The colour of the Indians is a bronzed red ; their hair is flat and stiff, and is cut across the forehead. The hairs of the beard, eyelashes, and eyebrows are always plucked out. The eyes are small and bright, the lower jaw prominent, and the teeth of dazzling whiteness. The mouth is always open, because the lower lip is drawn down by the weight of various ornaments, such as small pods, hairs of the ant-bear, rattles of snakes, etc. The skin is not tattooed, but painted with the juice of the *Genipa americana* and the *Bixa orellana*, or arnatto. The Indians can hardly be said to wear clothing. Occasionally a rag of European cloth or of material made of cactus fibres is suspended by a cord from the waist, but as a rule sandals of leather and collars of feathers or teeth of rodents are the only articles of dress. Their weapons are wooden lances, bows and arrows, clubs and hatchets. They feed on maize, sweet potatoes, goat's flesh, beef and caymans, and in the interior monkeys, iguanas, parrots, serpents, etc., are eaten. The natives enjoy good health as a rule, the most noticeable malady being skin disease, caused probably by their want of cleanliness. The caciques have authority only in war ; in times of peace they live and work like the other Indians.

## AUSTRALASIA AND POLYNESIA.

**The Rainfall of Kaiser Wilhelms-Land.**—The *Nachrichten über Kaiser Wilhelms-Land*, Heft i. 1890, contains tables showing the rainfall in that part of New Guinea. The mean for the three years commencing June, 1886, was 107·24 inches at Finschhafen, and 89·39 inches at Hatzfeldthafen. At Constantinhafen the observations for 1887-88 only are complete, and the fall for that year was 125·04 inches. It

is a remarkable fact that the quantities of rain which fall at Finschhafen, from December to April and from June to September respectively, are nearly in the inverse ratio of those that fall at the other two settlements. Thus, at Finschhafen 17 per cent. of the total rainfall of the year 1886-87 fell between December and April, and at Hatzfeldthafen 62 per cent.; while, from June to September, 1887, 62 per cent. fell at Finschhafen and 17 per cent. at Hatzfeldthafen. In the other two years the same relation obtained, though the figures were not so exact. The observations taken at Constantinhafen show, as far as they are complete, that at this station the rainfall follows the same laws as at Hatzfeldthafen.

**The Islands Yamma, Masi-masi, and Moar.**—These small islands lie off the coast of New Guinea, in about lat. 2° S. and long. 139° E., and are described by F. de Clercq, formerly Governor of the Moluccas, in *Cosmos*, April, 1890. The island of Yamma is low, and is almost entirely under cultivation. Everywhere are seen plantations of coconuts, sweet potatoes, bananas, breadfruit and other trees, tended chiefly by the women. Towards the west the island is cut in two by a narrow channel through which canoes can pass even at low water. The houses are built on piles: the roofs slope down to the floor on the sides, and the front and back are closed by walls of the leaf-ribs of the sago-palm. A window in the front wall serves also as a door, and the floor, projecting beyond the wall, forms a platform whereon kitchen utensils and firewood are kept. The interior, consisting of a single room, contains four fireplaces, two of which contain apparatus for smoking fish. From the walls and beams hang baskets of field produce, bags of bananas and tobacco, ornaments, fishing-tackle and other articles. Only one building stands on the shore, and that is simply a roof supported by four pillars, where the men meet to invoke the east wind before setting out to catch turtle. The natives are well built and muscular. They have broad noses and thick lips, and hair grows not only on their faces, but also over their bodies. Scars are not seen, and only a few men are tattooed on the back, but the septum of the nose and the ears are always pierced, the holes being gradually enlarged by the insertion of larger and larger pieces of bamboo. The women are not exactly beautiful; they are tall and wear their hair short. Intoxicating liquors are never drunk. Tobacco is cultivated, and the crushed leaves are smoked rolled up in a dry banana leaf. The canoes have an outrigger on the left side and are ornamented at the prow by a carved human figure supposed to allure the fish, and at the stern by the representation of a sea-mew. The dress of the natives is composed simply of a piece of cotton or bark suspended from a string round the waist. Earrings of tortoise-shell inlaid with splinters of shell are worn, and the hair is decked with cassowary feathers. Bracelets and little bags for betel, made of shells and fruit seeds, are procured from Tanah Mera, as well as water-vessels, pots and pans, etc. The principal occupations of the people are the collection of shells, carapaces, and fins of sharks, and the preparation of *copra*, of which some twenty-eight tons are exported annually. They take sharks and tortoise by means of a two-pronged harpoon with a line attached. Their only other weapons are bows and arrows. The arrow-heads are made of wood or bamboo, and some with five teeth are used to shoot fish. The best-constructed edifices are the *darma*, or temples. In design they resemble the dwelling-houses, but they are larger. The walls are painted with linear designs in white, red, black, and yellow, and the posts and the trunk which serves as a ladder are adorned with carved figures of men, crocodiles, sharks, etc. Here the natives solemnise feasts before setting out on fishing expeditions or raids on their enemies, and here also boys of ten years old must remain about a year before the septum of the nose is perforated. On reaching adolescence, they return to the temple for a period of two

months, after which they take part in the festivities. Charms are used, but divination is only permitted to discover a criminal. The other islands are also flat, and the inhabitants differ little from those of Yamma in manners, customs, and language. There are no chiefs, and even the older men have no authority over the rest of the people. In all the islands sugar-cane and turmeric are cultivated.

**Lord Howe Island.**—Halfway between Sydney, the capital of New South Wales, and Norfolk Island, one thousand miles to the north-east, lies a little speck of land known as Lord Howe Island. For administrative purposes it is attached to the colony of New South Wales, and is periodically visited by a magistrate from the colony. Some fifty people, the descendants, chiefly, of New Zealand settlers, live on the island. Six or seven miles in length by one in average breadth, and with a total area of 3220 acres, Lord Howe Island is crescent-shaped and rises on nearly all sides precipitously from the sea to the height of 2840 feet. It is formed of three volcanic ridges, connected by low flats of grass and sand. Right across from point to point of the island stretches, like the string of a bow, a line of coral reef, enclosing a belt of shallow water, less than a fathom in depth. At short distances from the island lie smaller ones, as the half-dozen Admiralty Islets, Mutton-Bird Island, Gower Island, Goat or Rabbit Island, and Ball's Pyramid. All these are rocky, precipitous, and not easily accessible. Ball's Pyramid is said to rise abruptly from the ocean, a perfect pyramid, up to the height of 1816 feet. The great feature about Lord Howe Island is, however, its profuse vegetation. Banyan-trees flourish and are particularly fine ; whilst palms, junipers, manchineels, tulip-trees, and others, with dwarf-ferns and a dense undergrowth, grow throughout the island. Of higher mammals there is, as might be expected, a noticeable scarcity, though goats, swine, and cats have relapsed from the state of domestication to wildness. Birds, however, especially sea-birds, are plentiful, and include some indigenous species, such as a thrush, two creepers, a fly-catcher, and a magpie. The zoology has unmistakable affinities with both that of New South Wales and that of New Zealand. The White Gallinule (*Galinula* or *Porphyrio alba*), a species of a genus akin to the New Zealand *Dinornis*, was formerly living on this island, but, like the *Dinornis*, is now extinct. The fish fauna is Australian in character ; it is not only abundant, but very interesting to the ichthyologist. There is a large number of species of edible fish. Special interest, too, attaches to the Mollusca, particularly the *Pulmonifera*. In respect of the climate, rain falls in showers throughout the year, and the temperature is genial the twelvemonth through. The thermometer sometimes rises as high as 80° F. in summer.—[Gathered from *Lord Howe Island* (Sydney, 1889), being a series of monographs on the topics touched upon, and others of scientific interest—the whole constituting the second Memoir of the Australian Museum of Sydney.]

**Pleasant Island**, or Nauru, is one of the Gilbert Islands, and forms part of the German protectorate of the Marshall Islands. Its perimeter is only 12½ miles. A coral reef, 160 to 320 yards broad, runs round the whole island at a distance of 300 to 600 yards from the shore. The villages of the natives are built on the strip of land beside the sea. There is also a large village situated on a small lake in the interior. Above the first belt of coral, which rises to a height of 50 to 100 feet, stands another on the inner side. The interior of the island is hilly and has a mean elevation of 120 to 130 feet. The inhabitants number about 1000, and are divided into twelve tribes which do not live in separate districts but are scattered over the island. A map of the island is given in the *Mitt. aus den Deutschen Schutzgebieten*, Bd. iii. heft 2, from which this note is taken.

## MISCELLANEOUS.

The **Vatican Observatory**, under the patronage of the Pope, has lately been revived. Señor Francis Denza, writing from Rome, desires us to give publicity to the fact, and invites an exchange of publications.

The **Island of Heligoland**, together with its dependencies, has been ceded by Her Britannic Majesty to His Majesty the Emperor of Germany. The change of Government was effected in August. Native laws and customs now existing will, as far as possible, remain undisturbed.

After all, no steamers will be allowed to ply to **Chung-king**. According to the *Times*, July 19, 1890, the Chinese authorities fear that the riverain population would be thrown out of work, and therefore will permit foreigners to make use of native boats only, or boats made after the Chinese model and manned by natives.

Of the **Railway across the Isthmus of Tehuantepec**, about 30 miles on the side of the Gulf of Mexico and 50 on the Pacific side are completed. A temporary bridge has been constructed across the river Tehuantepec, which will ultimately be replaced by an iron one.—*Revue Française de l'Étranger et des Colonies*, June 15, 1890.

In August 1891 a meeting of the **Congrès International des Sciences Géographiques** will be held at Berne. Societies, or their members individually, are invited to take part in the Congress, and to communicate their views on the subjects that should appear in the programme. The management is in the hands of the Geographical Society of Berne.

Several **New Railways** are being constructed **in Greece**. The longest is one being made by an English company from the Piræus and Athens to Larissa, with a branch to Chalcis. The line to Myli is being prolonged to Kalamata, on the Gulf of Coron. Other shorter and less important lines are in course of construction, or are projected.—*Revue Française de l'Étranger et des Colonies*, July 15, 1890.

The **Congrès International des Américanistes** will hold its next meeting at Paris from the 14th to the 18th October, under the presidency of M. de Quatrefages. A programme of the subjects to be discussed has been issued. These relate to the archæology and ethnography of America and the sciences connected with them, but any other questions bearing on the scientific investigation of the Continent may be brought before the meeting.

The construction of the last section of the **Buenos Ayres and Valparaiso Railway**, namely, the important part which is to cross the Andes, is progressing favourably. The line will run between Mendoza and Santa Rosa de los Andes, a distance of 155 miles, by the Pass of La Cumbre, which lies at a height of nearly 13,000 feet. The tunnel by which the railway will pass under the summit will be more than 3 miles long.—*The South American Journal*, June 21, 1890.

An **Exploring Expedition to Alaska**, under the auspices of the National Geographic Society, left Washington early in June. The leaders of the party are Messrs. Israel C. Russel and Mark B. Kerr, both connected with the U.S. Geological Survey. They are to start inland from Yakutat Bay, and, should they find more favourable conditions on the north side of Mount Elias than exist in the south, they will attempt to reach the summit.—*Bull. of the American Geogr. Soc.*, vol. xxii. No. 2.

## NEW BOOKS.

*The Origin of the Aryans. An Account of the Prehistoric Ethnology and Civilisation of Europe.* By Isaac Taylor, M.A., Litt.D., Hon. LL.D. Illustrated. London: Walter Scott. Pp. xi. + 339. (The Contemporary Science Series).

Canon Taylor had a double purpose to serve in this work: he had to show that the old theory which made the Aryans originate in some region of Western Asia, and people Europe by emigration, is no longer tenable, and to expound the views which now gain most favour with the learned. The former theory rested almost exclusively upon the conclusions of philologists, results of the comparative study of languages. Canon Taylor insists, and insists rightly, that language alone is not sufficient to solve the difficult problems connected with the subject. We must enlist the assistance of "prehistoric archæology, craniology, anthropology, geology, and common sense"; and of these not the least useful is surely the last. The first part of his scheme Canon Taylor has successfully accomplished. Of that there can be no doubt; common sense alone tells us that primitive man, even the primitive Aryan, had other possessions besides language: possessions quite as well calculated to weather the storms and vicissitudes of time as language. But common sense will not, we are afraid, indorse altogether the conclusions, or rather the method, of the author in Chapter II., in which he discusses the results of craniology as applied to the study of the remains of prehistoric man in Europe. In the first place, strict sobriety of judgment bids us conclude that, in spite of the array of facts which the author presents for our conviction, the time has not yet come when any satisfactory generalisation can be made from the evidence available, for it is after all extremely meagre and disconnected. The foundations upon which the whole matter rests partake far too much of the nature of probability and uncertainty to inspire any degree of strong trust in the inferences they are made to yield. The discussion in many places suggests acute and clever guessing rather than strictly logical induction. To argue, from the absence of cereals (say) among the remains of prehistoric man found in a particular cave or a particular locality, that the men of that epoch generally were not acquainted with cereals is, we fear, rash, to say the least of it. A close and careful reading of this book has convinced us that the wisest attitude to take up in the case is that indicated by suspense of judgment. Yet it must be stated—stated explicitly—that Canon Taylor's use of his materials is clever and able to a degree. Once you get over his premises you can hardly help keeping him company right away to his final conclusion. The sketch he draws of primitive Aryan civilisation (pp. 129-189) is extremely interesting. And both interesting and clever is the way in which he balances the evidence for and against the four races whom he regards as possible rivals for the honour of being the ancestors of the Aryan peoples; and so too his sketch of the evolution of Aryan speech is likewise able, learned, and interesting. He ranges over a very wide field of information; and in the narrow range within which we are able to check his statements we have observed only two to which exception can be taken. One is, that the Magyar speech is tending to give place to German (p. 207); the other, that the Scandinavians have little intellectual culture (p. 245). Neither of these statements is true; the latter is flagrantly wide of the truth. A word of praise must be given to the generally temperate tone in which the author writes. Beyond a gibe, quite excusable, at the philologists, Canon Taylor is not only fair, but even generous to the men from whose views he himself dissents. And this is saying a good deal when we remember the terms on which this controversy has been carried on in some

quarters. After this book, which virtually enounces the views of Schrader as laid down in his *Sprachvergleichung und Urgeschichte*, though modified, extended, and enforced by no slight original contributions by the present author, it ought to be universally accepted that the Aryans did not emigrate from Asia, but are indigenous to Europe, though we had better wait a while before deciding whether their original progenitors were the fair dolichocephalic Scandinavians or the florid brachycephalous Celts, or whether, indeed, they were not a race distinct from both.

*Les Anglais et les Hollandais dans les Mers Polaires et dans la Mer des Indes.* Par le Vice-Amiral JURIEN DE LA GRAVIÈRE, de l'Académie Française et de l'Académie des Sciences. Paris: Librairie Plon, 1890. 2 vols. Pp. 334 and 358.

We confess that we have been greatly puzzled by these two volumes. In the first place, we cannot discover what has been the principal aim of the author. The title does not convey a right impression of the contents of the book. Admiral de la Gravière takes us not only to the Arctic and Indian (*i.e.* East and West Indian) Seas, but he asks us to follow him to the African Coast (Madagascar, etc.), to South America, and to Japan and China. There is a lack of unity about his scheme that is even exasperating. A general history of Dutch and English sailors and their voyages to all parts of the world could have been made highly interesting, especially if the hostilities and rivalries of the two nations had been traced out in a proper, historical manner. As it is, we have in these volumes a disconnected series of voyages, extending from Sir Humphrey Gilbert and Frobisher down to Jacques Le Maire and W. Van Schouten, a period of some forty years. But why stop short at the year 1617? Why not have gone on to describe the great naval wars between the two Powers that were fought out in the later years of the seventeenth century? We suspect that these volumes are intended as a continuation of a previous work by the same author, entitled *Les Marins du Quinzième et Seizième Siècle*, with which, however, we are unfortunately not acquainted, though we are referred to it on innumerable pages of *Les Anglais et les Hollandais*. Nor is *Les Marins* the only one of the author's books to which too frequent reference is made; there are fully half-a-dozen others with whose titles we become quite as familiar before reading very far.

Still, it must be acknowledged that the author's style is far from being dull; he writes with genuine French vivacity; and, what is more, he unites with it something of the German erudition, thoroughness, and painstaking love of detail. His pages swarm with encyclopædic foot-notes, containing much useful information—often out-of-the way information. And he has had the happy idea to translate passages *en bloc* from the old navigators' narratives. But why devote fully three pages of small type to notes defining the geographical positions of such well-known towns as Copenhagen, Bergen, Throndhjem (Drontheim), Stockholm, Dantzig, Riga, Revel, and the like? Surely that was unnecessary labour! It may be added that Admiral de la Gravière cherishes a warm admiration for old Dutch seamanship.

*Les Lacs de l'Afrique Équatoriale: Voyage d'exploration exécuté de* 1883 *à* 1885. Par VICTOR GIRAUD. 161 gravures d'après les dessins de Riou, et 2 cartes. Paris: Hachette et Cie., 1890. Pp. 604.

This sumptuous volume of travels records in an entertaining manner the travels of Lieutenant Giraud in Eastern Equatorial Africa. From Dar-es-Salaam he marched to the head of Lake Nyassa, by a route that is known; but his travels in

the region of Lakes Bangweolo and Moero led him into a most interesting field for the explorer. The scientific results of his journey have been published elsewhere, and alluded to by us; whilst Mr. Ravenstein, in his paper on "Livingstone and Lake Bangweolo" (*Scottish Geographical Magazine*, vol. v., p. 125, *et seq.*) made special reference to them, adjusting Giraud's data with those of the great Scottish pioneer-explorer. Unfortunately, Lieutenant Giraud was prevented from penetrating further westwards—as had been his intention—owing to the revolt of his porters.

In many respects this volume of travels is perfect in its way. It is never tedious, and it gives a graphic account of the vicissitudes of African travel. The illustrations by the famous Riou, which enrich the volume, are numerous, and among the best we have seen in any book of travels: they are both spirited in design and artistic in execution.

*Great African Travellers. From Bruce and Mungo Park to Livingstone and Stanley.* By William H. G. Kingston and Charles Rathbone Low. With 100 Illustrations. London: George Routledge and Sons, 1890. Pp. 509. *Price* 7*s.* 6*d.*

The authors of this volume, in view of the awakened public interest in Africa, have done well to publish these popular accounts of the journeys of the great African pioneers,—or, at least, of those whose names are most familiar to English readers. The selection of names, for the scope of the book, is a good one. At the same time others might have been added with advantage, for the chapter dealing with supplementary travels is very inadequate. The authors have given us very readable and—as far as we have tested them—accurate accounts of the following:—(1) Bruce's travels in Abyssinia; (2) Mungo Park's travels in the Niger basin; (3) Travels of Denham and Clapperton across the Sahara and in the Sudan; (4) Journey of the Landers to the Niger; (5) Dr. Barth's explorations; (6) Discoveries of Burton, Speke, and Grant; (7) Livingstone's three great journeys of exploration; (8) the travels of Sir Samuel and Lady Baker; (9) Cameron's march across Africa; (10) Stanley's search for Livingstone, his Congo expedition, and his Relief of Emin Pasha. All these journeys are treated with sufficient fulness of detail, and supply geographical information by the way. Incidentally, too, they give in broad outline a history of modern discovery in Africa. Numerous illustrations—old friends—add to the attractiveness of the book. But it was surely a grave mistake not to give a map of some sort to assist the reader to follow the itineraries of travel? A map showing the main routes of the explorers ought to have been supplied. The *data* have evidently been derived from the published accounts by the explorers themselves. But it was not necessary to retain the old-fashioned spellings of place-names. A future edition should remedy these unpardonable defects.

There is no index.

*Nation-Making. A Story of New Zealand.* By J. C. Firth. London: Longmans, Green, and Co., 1890. Pp. 402.

Mr. Firth landed in New Zealand in 1854, and still resides in Auckland. He seems to have had unusually favourable opportunities of studying the Maori race, whose peculiarities he most graphically describes. According to him, the Maori, when the first settlers met him, was a fine-looking, amiable, brave, and dignified savage, living chiefly on fern roots, eels, and sharks. The difficulty of procuring

such food made the Maori both industrious and strong. His decline began when Captain Cook introduced the pig and potato, and thus furnished him with food easily obtained. "When the pig and potato," says Mr. Firth, "provided food for a year by a few weeks' work, then life became easier, and steady industry being no longer a necessity, ceased to be a virtue. The steady energy of the old fern-fed Maori vanished and his strength diminished. He became an impulsive creature, good for a 'spurt,' but incapable of long-sustained effort."

Like its aborigines, New Zealand has, as a colony, fallen from its original state of strength and prosperity. In common with most authorities, Mr. Firth has no hesitation in tracing the present financial difficulties of New Zealand to the "borrowing policy" propounded in 1870 by Sir Julius Vogel, then Prime Minister of the colony. Ever since then New Zealand has loaded itself with debt, until now the public debt of the colony amounts to £36,000,000 sterling, equivalent to a debt of £60 per head of the population. However, Mr. Firth does not despair of the future of New Zealand, for, to quote his own words, "like the prodigal of old, the colony has come to its senses. It is now going to work, not without some just flouting by its respectable elder English brother. For the present, the robes, rings, and fatted calves are in the distance. . . . The borrowed millions have gone. The pauper spirit they have engendered will die hard. Depression and hard times are not very pleasant medicines, but they are the best of all remedies, and will eventually help the colony to recover its natural health and vigour."

*Des Andes au Para: Équateur—Pérou—Amazone.* Par MARCEL MONNIER. Paris: E. Plon, Nourrit et Cie. Maps and Illustrations. Pp. iv., 443.

We have already (*Scot. Geog. Mag.*, vol. vi. pp. 380-1) presented a summary of the chief geographical results of M. Monnier's journey down the Huallaga, and for 125 miles up the Pastasa. For the rest, we can cordially recommend his book as an excellent and interesting narrative of travel, sometimes picturesquely written, sometimes smartly, and always clearly and with an evident desire to present his impressions exactly. The illustrations, too, will often be found serviceable, though some—*e.g.* the houses in the Calle del Arzobispo at Lima, and the lady who passes for the representative belle of that city—are sufficiently well known already. A good idea of the inaccessibility of Peru's Amazonian province, Loreto, is conveyed in the statement that its new Governor, following the quickest route, "had first to reach Panama, cross the Isthmus of Darien and the sea beyond, coast round Colombia, Venezuela, the Guianas, and sail up the Amazon as far as Iquitos—a voyage of more than two months. Although the distance from Lima to Loreto, over the Cordillera, is not more than 1500 kilometres as the crow flies, he had, in order to save time, to traverse about 10,500 kilometres, or more than a quarter of the earth's meridional circumference!" Therefore the wealth of the Amazon's head streams is not destined to reach the Pacific Coast, and M. Monnier anticipates that it will be tapped very thoroughly by the North Americans before the century is out. "The Dark Continent," he says, "which has already secured so many illustrious victims, is the region *à la mode*, the prey watched by nations suffering from the colonisation fever. Who knows but that it will be given to the Yankee, better advised, to set himself down in that land which both historical tradition and the work of three centuries would seem to promise as the possession of the Latin race? There are sufficient indications to justify one in affirming that North American speculation is preparing very seriously to lay its hand on this treasure."

*Scotland from the Earliest Times to the Present Century.* By JOHN MACKINTOSH, LL.D. "The Story of the Nations" Series. London: T. Fisher Unwin, 1890. Pp. xxi., 336. *Price 5s.*

To attempt to crowd the many and grave changes which have come over Scotland, to note the more important events which led to these changes, and, in so doing, to present a fairly continuous narrative, all within the narrow compass of 366 large printed crown octavo pages, is a task that might severely tax the ingenuity of any historian. Dr. Mackintosh has made the attempt, and, we regret to say, without conspicuous success. It is, perhaps, too much to expect an impartial and unprejudiced history of Scotland from the pen of any Scotsman, and the author is neither impartial nor unprejudiced. The want of balance so frequently observable in his pages is probably due to the necessary striving after compression. Examples of this absence of proportion may especially be noted in comparing the history of the '15 with that of the Disruption, the former occupying two, the latter eleven pages. Or, again, the union with England has eight pages devoted to it; but Lord Aboyne's Aberdeenshire campaign is passed by without notice. Many similar examples might be cited, but the foregoing are sufficient. Uniform with the other volumes, to the standard of which it does not attain, its general get-up is excellent; and a special word of praise must be given to the illustrations, which are, as a rule, well executed, and the subjects chosen with judgment. There is a fairly good index, but the map is poor and rough in execution.

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## NEW MAPS.

### EUROPE.

ALPEN, Geologische Uebersichtskarte der ——, entworfen von Dr. Franz Noë. (Topographische Grundlage: V. von Haardt's Uebersichtskarte der Alpen.) Massstab, 1 : 1,000,000. *Wien: Ed. Hölzel,* 1890.

When B. Studer, in 1851, published his classical *Geologie der Schweiz,* he added a small geological map of the Alps, which has now been long out of date. Since this first publication, no attempt has been made to produce a general map on a large scale, and educational institutions have been restricted to the use of such general maps of Europe as Dumont's and Prestwich's geological maps. The teacher has had to use for his more detailed instructions Von Hauer's map of Austria-Hungary, Gümbel's map of Bavaria for the Eastern Alps, Studer's and Escher's large map of Switzerland for the Western Alps, Vasseur's and Carez's map of France, and for the southern slopes the general map of Italy, executed by the Comitato Geologico. These maps, although not harmonising in scale and colours, are, each in itself, excellent works. The various principles applied will be noticed further on. Under these circumstances a general geological map of the Alps on a large scale was much needed, not only by teachers but by geologists. Dr. Franz Noë, and all who assisted him in his laborious work, must be congratulated on having produced such an excellent map. The data which have been made use of are the surveys of the K. K. Geologische Reichsanstalt in Wien, the K. Ungarische Geologische Anstalt in Budapest, the K. Bairisches Oberbergamt, the Geologische Commission der Schweizer Naturforschenden Gesellschaft, the Société Géologique de France, the École des Mines à Paris, the Comitato Geologico d'Italia, and the researches of the leading geologists on the Continent. Vincenz von Haardt's oro-hydrographical map of the Alps (1 : 1,000,000) has also been used

by Dr. Noë for this production. The colouring of the different geological formations is distinct, and the hills, printed in light grey, so as not to interfere with the clearness of the colouring, are a very valuable addition, and increase the usefulness of the map. An explanatory letterpress, written by Prof. Suess and Dr. Noë, accompanies the map.

**LIECHTENSTEIN**, Fürstenthum ——, Massstab, 1 : 75,000.
*Deutsche Rundschau, für Geographie und Statistik*, xii. Heft 9.
*Wien : A. Hartleben's Verlag.*

**MARE LIGURE**, Carta Barometrica del ——, e del Canale di Corsica, specialmente secondo il rilievi idrografici diretti dal Capo (ora Contr^ Ammo). G. B. Magnaghi. Construtta e disegnata da Guido Cora, 1 : 2,000,000.
*Cosmos*, vol. x. 1889-90. *Marzo* 1890. *Tavola* iii. *Torino : Guido Cora.*

**MITTEL-EUROPA**, Karte der Jahres-Isonephen von ——, mit Einschluss der Karpatenländer. Von Dr. Paul Elfert. Massstab, 1 : 5,000,000.
*Petermanns Geographische Mitteilungen, Jahrgang* 1890, *Tafel* 11.

**LESBOS**, Die Küstenlinien nach der an einigen Stellen berichtigten Aufnahme von Capt. Copeland (1834), das Innere nach Winkelmessungen und Wegaufnahmen von H. Kiepert, 1841, 1886, 1888, und Robert Koldewey, 1885-86. Massstab, 1 : 210,000.

Vertheilung der Vegetationsverhältnisse und des Bodenanbaus der Insel Lesbos nach den Beobachtungen von Robert Koldewey, 1885-86, und R. Kiepert, 1841, 1886, 1888. Massstab, 1 : 210,000.
*Berlin : Dietrich Reimer*, 1890.

On the first map, which indicates the topography and physical features of the island, the coast-line has been laid down from the surveys of British naval officers under Capt. Copeland in 1834; the interior has been compiled from the triangulations of Prof. Kiepert, in 1841, 1886, and 1888, and of R. Koldewey, in 1885-86. It was not until Prof. Kiepert revisited the island in the years 1886 and 1888, that he was able to take observations with the aneroid. The results of these observations are the numerous figures (in mètres) on the map which are not specially marked. All underlined figures are taken from the British Admiralty Chart. The heights in the vicinity of Mytilene, Mesa, and Ereso were trigonometrically determined by R. Koldewey. The hills are chalked and printed in brown, and, where a combination of shading and contour-lines has been adopted, they are based on special drawings by both authors. The different shades of blue indicate the depths below 20, 50, 100, and 200 mètres, respectively.

The second map shows the distribution of the vegetation and of the products of Lesbos. The different tints and colours indicate the cultivation of corn (cotton has been planted in the plain of Eresos), the distribution of vines, olives, oaks (*Quercus aegilops*), pines (*Pinus maritima*), and the region of uncultivated lands (trachyte and sand-hills).

The letterpress which accompanies the maps is a reprint from Koldewey's Lesbos, and contains the itineraries and notes of both authors. A map—Umgebung der Stadt Mytilini mit Angabe der Localnamen, nach Dr. C. A. Candargy (1 : 80,000)—has been added.

## ASIA.

**SYRIEN**, Karte des nördlichsten Theiles von ——, nach den Zeichnungen und

Reiseberichten von Dr. Carl Humann, DDr. O. Puchstein, M. Hartmann, und B. Moritz gezeichnet, von H. Kiepert. Massstab, 1 : 300,000.
*Berlin: Dietrich Reimer*, 1890.

Dr. O. Puchstein's Routen mit Sester zwischen Euphrat und Tigris, 1882. Massstab, 1 : 300,000. Anschliessend an den östlichen Rand der Hauptkarte.
*Berlin: Dietrich Reimer.*

This large-scale map of the northern part of Syria, which will prove very useful to every one visiting that country for scientific purposes, has been compiled from the best available sources. The style of the map is the same that Professor Kiepert has adopted for his large map of Western Asia Minor. The hills are effectively shaded and printed in brown, and where contour-lines are shown they indicate the special surveys and drawings of the following authorities :—1. C. Humann's original survey ; 2. The triangulation of the railway engineers under the direction of W. Pressel ; 3. (For the coast-line) the British sea-chart survey under Mansell and Brooker (1858). The heights, which are extracted from Nos. 1 and 3 and given in mètres, are engraved in bolder figures, the less well authenticated being in hair-line. Others, derived from the barometrical observations of Dr. Puchstein and von Luschan, are in parentheses. The routes of C. Humann with O. Puchstein and von Luschan (1883), O. Puchstein with Sester (1882), and F. von Luschan (Excursion on the Euphrates, 1883), are distinguished by coloured lines ; those of M. Hartmann (1882) and B. Moritz (1885) are delineated by continuous and dotted lines.

## AFRICA.

**CENTRAL AFRICA**, Sketch Map of the Route of the Emin Pasha Relief Expedition from the Mouth of the Aruwimi to Bagamoyo, 1887-89. Scale, 1 : 8,240,000.

**EAST AFRICA**, Kilima-Njaro Mountain. To illustrate the Paper of Dr. Hans Meyer. *Proceedings of the Royal Geographical Society, June* 1890.

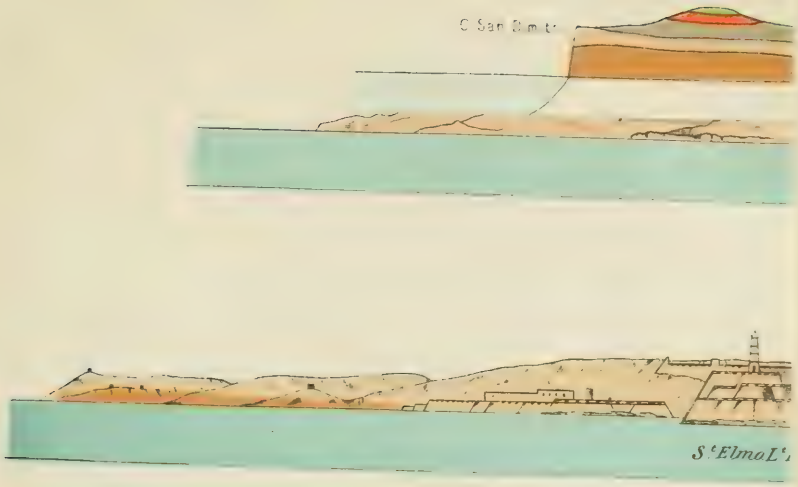
**THE INYATI AND THE ZAMBEZI**, Route Map illustrating Paper by the Bishop of Bloemfontein on the country between ——. Scale, 1 : 1,680,000.
*Proceedings of the Royal Geographical Society, June* 1890.

## CHARTS.

**KATTEGAT**, Isefjord. Maalestok, 1 : 60,000. No. 137.
**OESTERSÖEN**, Görnsund. Maalestok, 1 : 20,000. No. 152.
**NORDSÖEN**, Horns Rev med Omgivelsen. No. 150.
**FYN**, Farvandet sydfor ——. Maalestok, 1 : 50,000. No. 149.
**GROENLAND**, Sydlige del- No. 148.
*Udgivet af det Kongelige Sökart-Archiv. Kjöbenhavn*, 1890,

**NORTH AMERICA**, West Coast of Lower California. *San Quentin Bay to Cerros Island.* No. 1193.
West Coast of Lower California. *South Bay (Cerros Island).* No. 1192.
West Coast of Lower California. *Port San Bartolomé.* No. 1204.

**WEST INDIES**, South Coast of Cuba. *El Portillo.* No. 1196.
Island of Santo Domingo. *Manzanillo Bay.* No. 1210.
*Published at the Hydrographic Office, Navy Department U.S.A. Henry F. Picking, Captain U.S.N., Hydrographer.*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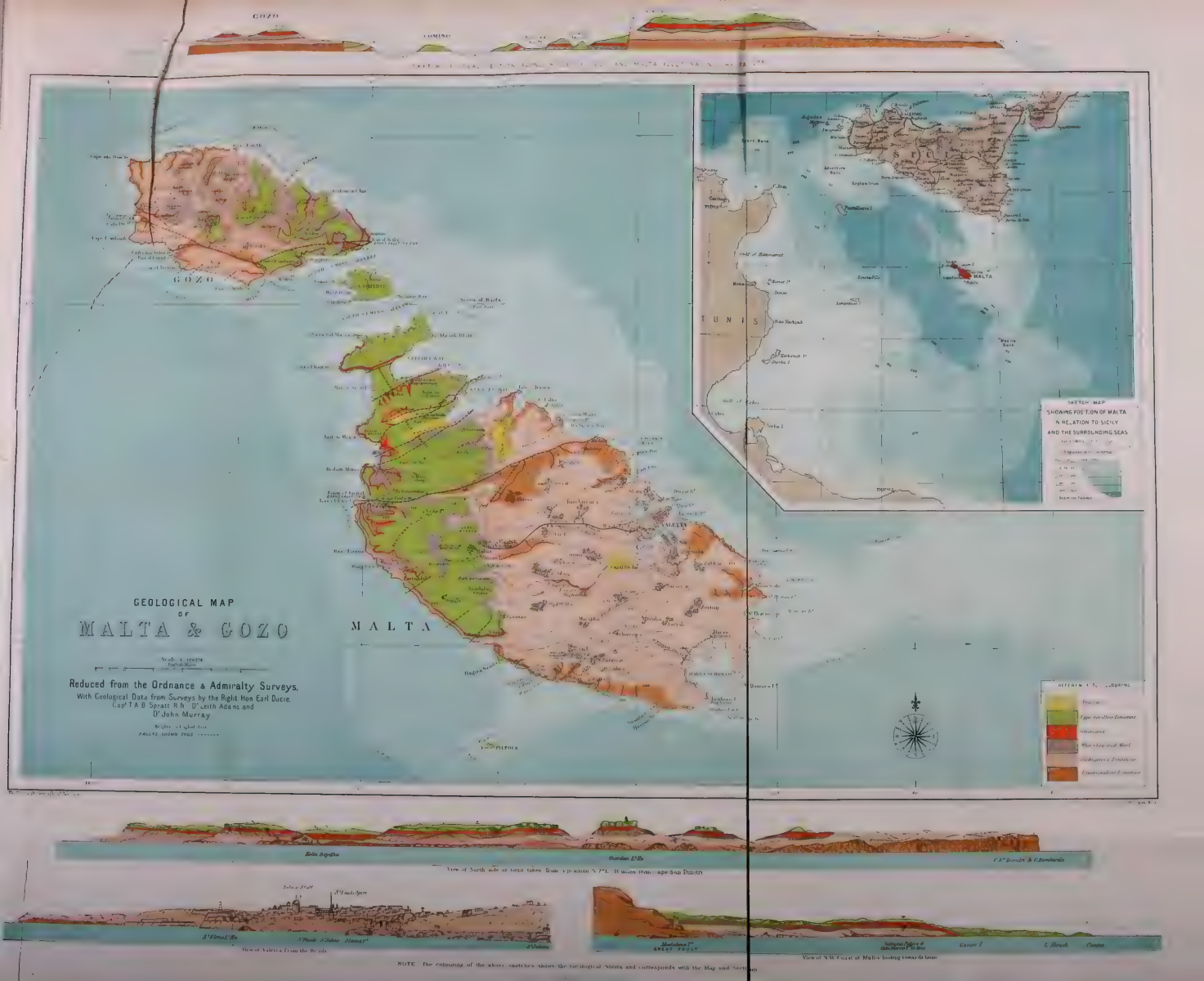
GOZO
COMINO
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GOZO
MALTA
SICILY
TUNIS
MALTA
SKETCH MAP
SHOWING POSITION OF MALTA
IN RELATION TO SICILY
AND THE SURROUNDING SEAS
GEOLOGICAL MAP
OF
MALTA & GOZO
Reduced from the Ordnance & Admiralty Surveys.
With Geological Data from Surveys by the Right Hon Earl Ducie,
Capt T A B Spratt R.N. D'Leith Adams and
D'John Murray
FAULTS SHOWN THUS
PILERIN
Upper Coralline Limestone
Globigerina Limestone
Lower Coralline Limestone
Guardia L'Isle
View of North side of Isola taken from a position N 7°E. 11 miles from Cape Sta Panith
View of N.W. Coast of Malta looking towards Isola
GREAT FAULT
NOTE The colouring of the above sketches shows the Geological Strata and corresponds with the Map and Section

THE SCOTTISH

GEOGRAPHICAL

MAGAZINE.

# THE PHYSICAL FEATURES OF BRAZIL IN THEIR RELATION TO THE COMMERCIAL AND INDUSTRIAL DEVELOPMENT OF THE COUNTRY.

*(Read at Meeting of British Association, Leeds, Sept. 1890.)*

By James W. Wells, M. Inst. C.E., F.R.G.S.

When one takes up a railway map of South America and sees thereon the long lines of railways radiating from Buenos Ayres to the north, west, and south, and penetrating to some of the most distant boundaries of Argentina, and then turns his eyes to the vast area of Brazil and observes, in comparison to the former country, what comparatively insignificant progress railway communications have been made in opening up the huge wilderness of inland Brazil, the thought naturally presents itself as to why so much has been done in one country and so much has been left undone in the other? The answer to that query will be found, not in a consideration of the advantages which one country can offer over the other in the matters of climate, soil, and natural resources, both vegetable and mineral—for those advantages Brazil is endowed with in a pre-eminent degree—but rather must we turn to a consideration of the physical aspects of these countries, and such a consideration will be the object of this paper, pointing out that the flat Pampas lands of Argentina (penetrated in all directions by many thousands of miles of natural fluvial communications all converging to a common centre on the sea coast) present great natural facilities for the comparatively inexpensive and consequently rapid development of communications and afford, for the purpose, an incalculable advantage over Brazil, where, with the exception of the Amazonian region, such facilities do not exist. For in Brazil what do we see? The major part of the southern coast line—the sea borders of the most favoured regions of the land—consists of the huge wall of the mountainous bluffs of the great undulating table-land which covers the major part of the country—a table-land which has its

highest elevations quite near the coast and thence gradually falls away towards the interior, and with the slope of the land naturally follow the courses of the rivers. Thus, a glance at the map of Brazil will show the main drainage systems of the land either flowing towards the interior as in the South of Brazil, or else, as in the east and west, flowing mainly in northerly courses more or less parallel to the coast.

The immediate consequence of this distinction between the surface configuration of Brazil and of Argentina is that heavy and costly railway work will face the Argentines only at the *termination* of their railway systems in the Andes, whereas Brazil has had to *commence* her railways from the very beginning by surmounting all the costly difficulties inherent to railway ascents from the sea-level to the elevated summits of the table-land and costing over £30,000 per mile. Only those who have watched or have known of the slow and costly progress of the early railways of Brazil—in days when such a thing as public native enterprise in that country was utterly unknown—can appreciate the patient plodding enterprise and forethought of the Brazilian Government in year after year impoverishing its resources, in capital expended or obligations incurred, in promoting the construction of these indispensable gateways to the commerce and productions of the interior. The benefit of a huge sum of £61,000,000 spent or ordered to be spent by the Government and by foreign and native companies in building Brazilian railways, altogether equivalent to about 8200 miles in length, is now year by year demonstrating beyond all question the wisdom of the past railway policy of the Government, not perhaps as to the means adapted to obtain those railways, but rather in getting them made, by hook or by crook, somehow or other, for 500 miles of Argentine lines could be laid down in less time than 50 miles of some of these early Brazilian railways. In the meanwhile, until the rich Brazilian uplands were thus opened up, the vast interior was no place for the immigrant, neither did it offer any immediate advantages to the native farmers. Even when the São Paulo railway reached the city of São Paulo, the railway traffic was little more than the productions obtained from near localities. Since then, however, the Brazilians have aroused themselves, and from that one gateway to the sea they have constructed, or are constructing, thousands of miles of railways to the north, west, and south (all of which is done by means of native capital, engineers and contractors), and having, moreover, dispensed with the costly aid of London financiers, they have suppressed one of the most expensive items of cost of foreign-built railways in Brazil.

The present rapid development of Brazilian railways is mainly due to the fact that Brazilians now see their opportunity for, and realise the advantage of, the construction of long lines of inexpensively built railways through new and fertile regions of the distant interior, and the very fact of the existence of such works of construction offers means of immediate profitable employment to thousands of Italian and other immigrants, who, without such ready sources of employment, would have wandered fruitlessly over those same regions in quest of occupation. Now, these immigrants not only constitute excellent labourers for the various railway works, but, as they gain a knowledge and experi-

ence of the country, they will eventually settle in those very new regions which the railways have brought into communication with the coast, and thereby add their quota to the productive powers of the country.

Last year there happened in Brazil what is usually designated as a "boom" in the floating of all kinds of railway, industrial, and commercial undertakings, and, although the Revolution killed it for a time, it has now again burst forth with renewed vigour, and on taking up any recent Rio newspaper, it is perfectly astounding to see, week by week, the immense numbers of public companies floated in Rio and in São Paulo, many of which may well be called "wild cat" schemes; but the wonder is where the money comes from. I contend that it has always been in Brazil, but locked up, uselessly seeking for a means of investment pending the arrival of the day when railways have climbed the mountain scarps of the sea-front bluffs of the table-lands, whence, on the gentle rolling uplands of the interior, the Brazilians can now go ahead with their railways as the Argentines have done. These few remarks will thus, perhaps, tend to show how the physical configuration of a country may tend in one case to hasten, in the other to temporarily retard, its development. In a paper I had the honour to read before a meeting of the London Chamber of Commerce, in April of 1887, I ventured to draw attention to the probable course of the future lines of internal railway or fluvial communications of Brazil by the following remarks:—

"Thus having briefly indicated the direction of the efforts now being made by the wealth and enterprise of the seaboard regions to reach the distant interior with communications, I would like to point out what I consider is the natural course for a trans-continental line. I refer to the great valley that, with its immense navigable rivers, traverses the South American continent from the Plate to the Amazons, and intersects the central regions, including Bolivia and Western Brazil. This valley follows the courses of the rivers Paraguay, Guaporé, Madeira, and Amazons. On this route the highest elevation is not more than 600 feet above the sea. But the development of this route would cause Pará and Buenos Ayres to be the respective outlets of these central regions, and, in the latter case, much to the detriment of Brazilian interests. Still, it is so obviously the natural course, that I cannot help believing that it will be eventually the line of main internal communication of the South American Continent and, perhaps, onward through Central America to New York. At the same time, you will see that the extension of the Mogyána line from São Paulo to these central regions will be, as a system, a very important one, for, by means of, here and there, comparatively short branches, it will be able to link together the traffic of immense navigable rivers, such as the Paraná with the Tocantins and Araguaya; the Paraguay with the Guaporé, the Tapajos, the Xingú, and the Araguaya, all of which northern rivers are very slightly separated from those flowing south. Of course it is now premature to discuss such a vast system of communications under the present circumstances of these central regions, but I have done so, as I think it quite possible that the present rapid march of the world's progress may produce the initiation of the development of these long neglected central regions of

natural wealth much sooner than would be supposed. I regret that time will not permit me to say something of the climate, soil, and productions of Central Brazil and Bolivia, and something also of the navigability of the great rivers. There is much both for and against, and all in all there are conditions favourable to a healthy and prosperous colonisation of these central regions, but it will require time, men, and money to produce it."

Since I made these remarks, now more than three years ago, the progress of railway work in Brazil, and generally in South America, has tended largely to realise my anticipations. For instance, on the 22d February last, the Pan-American Congress, sitting at Philadelphia, received a report from its railroad committee, declaring that a railroad should be built connecting the nations of North and South America, utilising existing railways when possible. Moreover, contracts have been entered into with the Bolivian Government to extend the Argentine railways in a northerly direction through the eastern portions of Bolivia.

The Mogyána Railway also—which will certainly be the Great Central line of the country—has now entered the State of Goyaz on its way to, or near the capital of that State, and contracts have been made for its extention to distant Cuyabá.

As a further indication of the energy now being displayed in Brazil, a great system of lines (1600 miles in length, including branches) has been contracted to be built from São Paulo to Rio Grande do Sul. The cost of these table-land railways does not exceed £5000 per mile, whereas the coast lines ranged from £25,000 to £32,000 per mile. Consequently it is very easy to see that, in a comparatively few years, the railway map of Brazil will show a vastly different aspect from its present appearance, and then, with increased immigration—which will follow as sure as the day follows the night—and with ready means of transport, I maintain that the progressive prosperity of the vast regions constituting the Republic of Brazil will be phenomenal, even in the face of what modern times have shown in the rapid growth of other new countries. For example, let us ponder awhile and think how undeveloped would have been the N.W. of Canada had not the Canadian Pacific Railway traversed its wild solitudes.

Happily Brazil has now passed through two most dreaded events, either of which might possibly have wrecked the country, namely, the emancipation of the slaves and the establishment of a Republic with the deposition of the Emperor. But no; peace and prosperity actually exist, industrial enterprise is most active, the national currency maintains a high value; and finally, according to the latest Brazilian news, shoals of Italian immigrants are now arriving in Brazil from Argentina.

To turn to the Amazonian region, or "Plains of the Amazon," as Humboldt described the vast hollow, we find a configuration of land and water somewhat similar to that of Argentina, but with the chief difference that whereas the flat pampas lands of the latter present an unbroken horizon of grass, the valley of the Amazons is one vast primeval tropical forest, abounding, it is true, in all the wealth of tropical flora in its most bountiful and varied forms, yet accompanied, as such similar regions

usually are, by all the plagues of fevers and insect torturers, such regions will long remain unadapted for settlement by white labourers. On the other hand, the wilds of the forest are so rich in their many valuable products, such as india-rubber, Brazil-nuts, medicinal herbs, and balsams, etc., that the temptation to thousands of the labouring classes of those and adjoining regions to go there and pass a nomadic life in gathering the rich spoils of the forests has been the means of making some of the most distant extremities of the Amazonian tributaries echo to the screech of the whistle and the thud of wheels of steamships. Year by year the beautiful, but oftentimes deadly, forests claim their victims, sometimes by thousands, amongst the adventurous explorers of their recesses; nevertheless, year by year an ever-increasing number of men proceed up river, year by year the exports of the forest increase in quantity, and with them correspondingly increases the traffic by steam-ships. Thus, in this Amazonian valley, the natural fluvial means of communication have opened up more distant regions than in any other part of Brazil, because elsewhere such natural facilities have been non-existent.

With regard to the climate of this part of Brazil, it is as well to remark that whereas the majority of the tributaries of the Amazons are decidedly unhealthy, the main river itself is very fairly salubrious; in fact, the city of Manáos may be considered quite a healthy locality. The reason of this is that the course of the main river being more or less parallel to the direction of the purifying breezes of the trade winds, the malaria, which would otherwise collect, is swept away, whereas the direction of the tributary rivers being more or less at right angles to such winds, the surrounding forests prevent these winds from dissipating the malaria arising from their often swampy shores, and leave it to generate in undisturbed strength.

In all new countries the course of the chief navigable rivers has been, almost without exception, the line of inland settlement by the primitive inhabitants or settlers. We have seen it in old England, where the course of the Thames abounds with historical legends of the occupation by early Briton, Roman, Saxon, Dane, and Norman. The Niger, the Congo, and the Zambesi are likely to be the highroads to the interior of the Dark Continent. So in Brazil, the Amazons, the Madeira and Mamoré, with the Paraguay and La Plata, were long the main roads of the early explorers and settlers of the country. Then, on the discovery of diamonds and gold in Matto Grosso, every river from the coast of São Paulo flowing to or from the direction of Cuyabá, was utilised as a carrying agent for explorers and traders, and for more than a century the Pass of Camaguan, in the watershed of the Paraguay and Paraná, was utilised as a portage for canoes from one river system to the other. This route has now been long abandoned as a trading route from São Paulo because better facilities are obtainable by steamer from Buenos Ayres to Cuyabá *viâ* the Rio Paraguay, which river, before the Paraguayan War, was closed to Brazilians. But, with the adoption of this latter route, much, or rather all, of the central trade of Brazil must necessarily find its way to Argentina, and, to obviate this detriment to her interests, Brazil is now pushing her railways to those distant regions *viâ* the Mogyána Railway.

The question may be asked, What is the railway going to do when it gets there? Will it pay when it does so? Certainly not, one may safely reply, any more than did the São Paulo railway for some considerable time after it reached its present terminus; but that same line, the most costly in Brazil, is now one of the best-paying lines of the world. Financial difficulties must necessarily be expected to accompany the early years of these intended great inland railways of Brazil, but I feel so assured of the existence of vast mineral wealth stored away in these inland regions that I venture to repeat again and again my conviction that the opening up of these distant regions by railway or any other communications will eventually lead to another rush of adventurers and settlers like what has been seen in California, Australia, and lately in South Africa. To prove what a virgin world are yet many of the central regions of Brazil it is only necessary to read the account of the researches of Dr. Carlos von den Steinen in 1887 amongst the indigenous tribes of the head waters of the Rio Xingú, where he found, not only what he alleges to be the descendants of the races of people who emigrated to the Spanish Main, where they were known as the Caribs (an English corruption of the Spanish word for Cannibal), but he found these same River Xingú tribes in this nineteenth century actually living in the conditions of the Stone Age, for they were absolutely unacquainted with the use of metals.

As to the prospects of Brazil being eventually settled by the overflow of the teeming populations of the various countries of Europe, I will merely observe that the area of Brazil is sufficient to contain fifty-six Englands and Wales, and that in that vast space, extending over about 40 degrees of latitude and consisting of varied elevations of land, it is easy to conceive that practically all sorts and conditions of climate and soil may be found to suit all sorts and conditions of settlers, and their various requirements. Means of transport only are wanting, and when those are forthcoming, I see no reason whatever why Brazil should not be in a position to follow well in the footsteps of the United States. If she does not go ahead, it will be the fault of her citizens, but not of the country.

I will now conclude this short paper, as the time allotted me for its delivery will not permit me to treat the subject more fully, but I trust it will at least serve to lead up to some questions on other Brazilian matters which I shall have much pleasure in doing my best to reply to.

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## ON THE PRESENT STATE OF THE ORDNANCE SURVEY AND THE PARAMOUNT NECESSITY FOR A THOROUGH REVISION.

(*Read at Meeting of British Association, Leeds*, 1890.)

By Henry T. Crook, C.E.

In his presidential address to this section at the Brighton meeting, eighteen years ago, Mr. Francis Galton dwelt on the comparative neglect

and indifference which the public showed to the work of the Ordnance Survey.

In proportion to the area of which Government maps are procurable the demand for the maps at the present time, judged by the sales, has not increased. It would seem, therefore, that the productions of the Survey have become less, instead of more, popular since the time when Mr. Galton drew attention to the matter. In a scientific age, when the purposes for which accurate maps are required are ever increasing, the falling off in the sales of the national maps, for the making of which the country has paid an enormous sum of money, is, to say the least, a startling phenomenon. Nearly twenty years ago, estimating from the annual value of the maps sold at that time, General Sir Henry James thought that when the survey was completed (which, in theory at all events, it is now) the yield from sales would be at least £30,000 per annum, whereas for the year ending last December the value of sales only reaches the paltry amount of £13,164, whilst the value of presentations to public departments and Government institutions, and under the provisions of the Copyright Act, amounts to nearly £6000. It would be difficult indeed to find a parallel for a work of equal magnitude and importance yielding such disappointing results. The partial failure of our great national cartographical institution to realise the legitimate expectations formed of it seems a proper subject of inquiry for the British Association, one of whose objects is the removal of disadvantages impeding the progress of science. There are only three ways in which this condition of things can be explained. They are:—

1. That even with the schoolmaster abroad the present generation requires fewer maps.
2. That the maps are not accessible, and therefore not known.
3. That the maps do not meet popular requirements.

The first explanation is obviously untenable; there is a good deal to be said for the second; but, after careful examination and inquiry, I have come to a decided conclusion that there is far more importance to be attached to the third. Speaking of the one-inch maps only, Mr. Galton said: "It is much to be regretted that these beautiful and cheap maps are not more accessible. They are rarely to be found even in the principal booksellers' shops of important country towns, and I have never observed one on the bookstall of a railway station. Many educated persons seldom, if ever, see them; they are almost unknown to the middle and lower classes; and thus an important work made at the expense of the public is practically unavailable to a large majority of those interested in it, who, when they want a local map, are driven to use a common and inferior one." This can be more truly said of the large-scale maps than of the one-inch, which is the only one at all popularly known, and, in fact, is often spoken of as *the* ordnance map. The latter is by far the most important of the series to the bulk of the map-using public, and something more than the mere difficulty of obtaining it is required to account for its unpopularity.

We cannot arrive at a right conclusion as to what it is that stands in

the way of the full and complete utilisation of the Ordnance Survey, unless we take into consideration its work as a whole. The department has attempted, or has been directed to undertake, far more than it had the means to carry out in any reasonable time. The cadastral surveys have, during recent times especially, occupied the chief share of the department's energies, to the exclusion or indefinite delay of the original and more popular work. It has almost abandoned cartography for land surveying: maps have given place to plans. No one, in these days, will dispute the advisability of carrying out the parent survey on the largest required scale, but, like most scientific undertakings, the survey has suffered severely from constant Parliamentary interference; the scope of the undertaking has been enlarged without a corresponding increase in the establishment and in the annual grant. Since the general lines upon which the work was to proceed were finally determined in 1863, the chief difficulty has been with the throttle-valve of the Treasury; the result is that, after more than a century's existence, the department has not yet completed one of its works. Apart from mere skeleton or index maps, it has not yet produced on any scale a uniform map of the British Isles.

A generation has elapsed since the completion of the great triangulation, and yet of the original scheme—the one-inch hill-shaded map of the kingdom—there still remain to be completed 30 out of the 131 sheets of Scotland, and 25 out of the 205 comprised in Ireland. The six-inch map commenced in Ireland in 1825 is the nearest to completion; it is stated that it will be finished early next year. The $\frac{1}{2500}$ map, commonly known as the 25-inch, the true cadastral survey, was commenced in 1854; considering the magnitude of the task, it has, so far, been executed more rapidly than any, but still a great deal remains to be done. The important counties of Lancashire and Yorkshire, several counties in Scotland, and almost the whole of Ireland, excepting Dublin county, have still no maps on a larger scale than six inches to the mile. It has, in fact, only just been decided to re-survey Ireland on the 25-inch scale. In those districts where the one-inch map had not been published, the change, first to the six-inch and then to the 25-inch, for the parent survey, necessarily delayed the publication of maps on the smaller scales until the introduction of the photographic and photozincographic methods of reduction and printing. Still one cannot fail to be struck by the phenomenal slowness of production which has characterised the work as a whole. In consequence of the length of time which it has taken and the neglect to provide for a timely revision the major portion of the maps are obsolete and of little more than historical interest.

No one who knows anything of the subject questions the original accuracy and finish of most of the maps which the Ordnance Office has produced, or of the valuable work which has been done in the advancement of geodetical and astronomical science. It is necessary to say this, for it has frequently been charged against those who have from time to time presumed to criticise the work of the Survey, that they have been oblivious of these things. At present we are concerned merely with the question why the maps are so little utilised and the reasons for the

apparently low estimation in which they are held by the public. Stated in the probable order of their importance, I think the reasons may be tabulated thus:—

*A.* The maps fail in many cases to meet the requirements of the classes of users for which they are presumably designed, on account of—

(1) Age. For want of revision large portions of even the 25-inch, but more particularly the six-inch and one-inch maps, are very incorrect, and in many cases quite obsolete.
(2) Bad impressions or impressions from old and worn-out plates.
(3) Complexity (in the one-inch map) through overcrowding of detail, causing confusion, the map being printed in only one colour.
(4) Deficiency in information as to ground forms, particularly in the six-inch map (excepting Lancashire and Yorkshire).
(5) Want of uniformity.
(6) High price, especially in the case of the six-inch, quarter sheets, and on all scales where sheets are partially blank.
(7) Lack of explanatory information with the maps.

*B.* Inaccessibility. The general public knows little or nothing about the maps because of—

(1) The system of sale.
(2) Bad indices and absence of information as to age and style of maps published of particular districts.

It is impossible to estimate the separate effect of each of these defects in the maps and in the means of distribution, but a few examples will establish the fact of their existence and the way in which they operate in depreciating the value and checking the sale of the productions of the Survey.

Suppose, for instance, a member of this Association coming to Leeds desires a handy map of the district, and turns to see what the Ordnance Survey provides for him. He will find the town of Leeds is in the south-west angle of sheet seventy of what is facetiously called the new one-inch hill-shaded map, date 1858. He will be able to obtain the sheet to the west of the same series, but for the southern half of the desired map he will have to fall back upon two sheets of the old survey, dated 1841-3, much inferior, of a different shape, containing only three-quarters of the area of the new sheets, but equally expensive. The resulting map is eminently unsatisfactory; it shows defects 1, 2, and 5 very conspicuously. To the environs of Leeds as they are to-day it is no guide whatever. So far as the ground forms are concerned the two upper sheets are good enough, but in the two lower the hill-shading has practically vanished, and in many places the roads and rivers are fast fading away also. The plates are obviously quite worn out.

Let us now look at the English Lake district. Here, at all events, if the maps meet popular requirements, they ought to be in constant use. But what do we find? Traverse the Lake district from one end to the

other, you will see plenty of maps of all kinds in use, but seldom indeed will you find that any one of them is an Ordnance map.

Here are four sheets, 29, 30, 38, 39, again of the new series, though this time the date is only quarter of a century back. Defects 1, 2, 3, and 5 are all more or less noticeable.

Here the want of uniformity is not in the age and style or shape of the sheets, but in difference in depth of shade of the impressions. It may be said that, by careful selection, the sheets might be better matched; possibly so at the Survey Stores. This is the best the agent could do; it is a fair specimen of what the public gets, and therefore one by which the Survey must be content to have its productions judged. The hill-shading, particularly in the Coniston sheet, has become quite woolly, consequently the hill forms are deficient in relief and character. A very large proportion of the names are illegible, and the plate seems to have been injured in places by the erasure or alteration of some of the figures denoting the heights of mountains. The roads and footpaths are very indistinct, and some of the most frequented are not even shown. I have recently compared the maps of this district by Bartholomew in a well-known guide-book, and, for pedestrian purposes, bald as they are, they are more useful than the Ordnance maps.

The important question of price also comes in. The Ordnance sheets alone cost 4s., but to be of any use they must be made up in a portable form, which can only be done by sectioning and mounting. Thus, before the Ordnance map of this district can be utilised, an outlay of 7s. 6d. is required, a sum sufficient to buy two copies of a good guide-book with all its maps. Can we be surprised, then, that the public do not buy the Ordnance maps?

Sheet 38 is printed from an electrotype taken in 1882. I do not know at what date the plan of keeping the original plate or the first electrotype matrix was introduced, and it may be that the plates of these sheets, for which at one time there was a great demand, are much worn, which would account for the fact that the Lake district sheets now sold are some of the worst of the new series of the northern counties. Compare, for example, the Hawes sheet, No. 50, which retains nearly all its original beauty and crispness of definition in the ground features.

If it be of the south of England that we require a topographical map, we shall fare no better; rather worse. Last year I required a map for the Volunteer manœuvres in the neighbourhood of Eastbourne. There is no map suitable for military purposes—that is, showing the ground features—of more recent date than 1813. It is one of the earliest maps of the Ordnance Survey, published at the Tower by Colonel Mudge. For the time of its execution undoubtedly a most creditable piece of work, it is, curiously enough, in a better state so far as regards definition than the maps of the Lake district made fifty-two years later; but, speaking from experience, I can say that the ground features are by no means correctly delineated. This can be proved by another sheet, No. 8, also done under the direction of Colonel Mudge and evidently by the same hand, which may be compared with the new hill-shaded map. From about 1830 onwards the hill-shading much improved, and has

continued to improve until it can now be fairly claimed that maps recently issued are unsurpassed in this particular by the productions of any country, but it is no satisfaction of the claims of inhabitants of Sussex to be told that they can have an exquisite map of the Western Highlands of Scotland, and no one will maintain that these maps of sixty to eighty years ago answer the reasonable requirements of to-day. Towns such as Eastbourne, Hastings, St. Leonards, and Newhaven are shown as mere villages. It is upon an entirely different England we are gazing in these sheets, and one is inclined to resent the attempts made here and there to modernise them by addition and alteration; the railways especially seem a shocking anachronism. Such additions and alterations destroy the real value of the maps as antiquarian documents. In this connection it is particularly interesting to note the disappearance of the commons and the village greens in comparing the new and the old maps.

Why should the public buy these maps when it can get maps at one quarter the price, which, for most purposes, are as useful, and, what is of greater importance, up to date? The truth is, that of the whole of the southern counties of England (except in the few places where the new hill-shaded map is published) no topographical map worthy the name exists, and for the remainder of England and Wales, where it does exist, its antiquity robs it of much of its utility, and the plates of populous areas are worn out. The so-called New Survey, north of the line Preston, Leeds, Hull is, we have seen, from twenty-five to thirty-five years old; whilst the few sheets published of Surrey, Kent, and Hampshire are from surveys at least twenty years old. The more recent sheets published of this map do not bear the date of the survey. The Aldershot sheet, for example, published in 1878, is from a survey of '70-71. Reference has to be made to the six-inch map to obtain this information. This is not fair to the purchaser, who, in most cases, is ignorant of the internal arrangements of the Survey, and imagines the map to be corrected up to, or within a short time, of the date it bears.

The new one-inch map, published without the hill features, called the outline map, gives no idea of the nature of the ground. Only contours of every 100 feet are given, and these are so finely drawn as to be barely visible. Even without the hill-shading this map is often so crowded with detail that it is very confusing and difficult to read. Take, for example, sheet 38.

Many sheets are spoilt by the number of names of parishes and boundaries, which might very well be omitted from both the outline and hill-shaded one-inch maps. Of the 360 sheets comprised in the new one-inch map of England and Wales, 179 have been published in outline and 81 with the hills shaded. The outline map cannot be considered anything more than a stop-gap publication. It is true the Director-General says the outline map appears from the numbers sold to be more popular than the hill-shaded. One is loth to assume that the ignorance of topographical representation in this country is so great that there is a preference for the sweet simplicity of a map giving practically only the horizontal development of the ground over one representing

both the horizonal and vertical configuration. But it can easily be understood that an outline map from a survey of 1870 may be preferred to a hill-shaded one of 1813, which, as we have seen, is the only choice open to a Sussex man. There is a danger, too, in the publication of the outline map which must not be overlooked, and that is, that the Treasury may consider it an excuse for still further delays in the publication of the topographical map. Looking at the return for the last four years, it would appear as if advantage had already been taken of that excuse. Here is the return :—

ENGLAND AND WALES, 59,540 SQUARE MILES.

*New one-inch map. State of publication.*

| Year ending | Total area completed. | | Area completed during year. | |
|---|---|---|---|---|
| | Outline. | Hills. | Outline. | Hills. |
| Dec. 31st 1886 | 18,616 | 11,544 | 432 | 52 |
| ,, 1887 | 24,150 | 11,955 | 5,534 | 411 |
| ,, 1888 | 25,101 | 12,524 | 951 | 569 |
| ,, 1889 | 29,478 | 12,524 | 4,377 | *Nil* |

This table shows that last year the hill-shaded map was not advanced at all, whilst the maximum rate any time during four years has only been two or three sheets per annum; at this rate the map will be completed towards the close of the next century. Fortunately the case is not quite as bad as it would seem to be from the present rate of progress. In his last report the Director-General estimates that it will be completed in 1925. Anyway we shall have to wait for nearly a generation before we shall be in possession of a complete and tolerably uniform topographical map of the United Kingdom. Surely such a statement by itself is sufficient to condemn the system by which the Treasury doles out the grants for each particular map bit by bit.[1]

The deficiencies of the one-inch map have been treated at some length, because it is the most important from the popular point of view. Most of the defects, it will be seen, are due to the age of the maps and the want of revision, and the same will be found to hold good of the six-inch and larger-scale maps.

The six-inch, or county, map has undergone more vicissitudes than any other of the Ordnance series. The maps of the counties in England and Scotland first surveyed on this scale are the finest productions of the Survey (for examples see sheets 78 and 79 of Lancashire). Commenced in a style which soon aroused the attention of the economists in Parliament, it was stopped in 1851. Then came the battle of the scales, after which the $\frac{1}{2500}$ scale was finally adopted as that of the parent survey. When, ultimately, it was decided to resume the publication of the six-inch map by reduction from the larger scale, it was with a greatly reduced number of contour lines. Unfortunately, it appeared to the Commission

[1] In consequence of the limited sum spent on it annually, the hill-shaded map of England and Wales alone will have, when completed, occupied fifty-three years in the making.

of 1858 that the original work was too elaborate, and it recommended some economies which, of course, the Treasury jumped at; consequently the rest of the country has been deprived of the only map which gives an adequate delineation of the forms of ground. For nearly all scientific purposes, but especially geological and engineering, maps on this scale are essential (where the $\frac{1}{2500}$ scale is published there is little other use for them); in fact, it was from the representation of geologists and engineers that the publication was continued. Being a map intended for the use of particular classes, it ought, as far as possible, to meet the requirements of those classes, which in its present form it does not. The adoption of the photographic method of reduction and printing necessitated the publication in quarter sheets, which can never have the exquisite finish of the old sheets of Lancashire and Yorkshire; but, however much the absence of artistic merit might be regretted, a process which ensured more rapid publication would have been welcomed had it not been accompanied by an advance in price equal to 60 per cent. Before the introduction of the photozincographic method of printing, the introduction of photographs for the reduction of the cadastral maps is said to have effected a saving of £35,000 on the survey. The users of the six-inch map can fairly claim that, as they have to pay so much more for an inferior map, the least that could be done for them is to spend the money saved at their expense in completing the contouring at 25-feet intervals throughout the country.

One of the most irritating defects of the large-scale maps is the partly blank sheet. In the case of the more recent issues this defect has been remedied by transferring a portion of the contiguous county map, but, when the two surveys are of very different dates and style, this can hardly be successful; but still it is better than the extensive patchwork arrangement which is required to make a map of a river basin, when the river and tributaries are county boundaries, as, for example, the Mersey. To complete one Cheshire sheet, No. 20, of the valley of the Goyt, no less than six quarter sheets of the Derbyshire county map are required. The six-inch, when up to date, affords a handy town map, but, where the sheet lines happen to cross a town, the number of sheets required (which may be many as four, costing 4s.) gives the Ordnance map no chance in competition with inferior, but very much cheaper, reproductions. If the maps for which the nation has paid so large a sum are to be freely circulated, the department must learn to cater for public requirements. If private individuals find a remunerative sale for cheap reproductions of the survey, the department must compete with them, not necessarily as to price, but the price and quality combined must be such as will, in the case of an educated purchaser, turn the scale in favour of the Ordnance map. There is no reason why special sheets of all considerable towns and environs should not be prepared by transfers on the six-inch and one-inch scales. There is amongst the miscellaneous maps of the Survey one of the environs of Glasgow, on the one-inch scale, prepared in this way (price 2s.), which, if printed in colours, hill-shaded, and folded into a cardboard cover, would answer the purpose.

It cannot be denied that most of the Ordnance maps are very

expensive. Sir Charles Wilson says that the selling prices per square inch of the Ordnance Survey maps are cheaper than those of foreign countries, excepting France and Italy. This, however, is hardly the point. The survey costs, roughly speaking, a quarter of a million per annum, and the value of the maps sold annually is about £13,000. Clearly, the price of the maps is a matter of very little importance for the amount yielded, but it is of the greatest importance if the maps are to be made available for general use. The basis upon which the prices of the different maps are fixed does not seem a very rational one. It lies in a very refined distinction between the cost of production and the cost of publication. The cost of production is supposed to end with the engraved copper plate in the one case and with the photographic negative in the other. The subsequent processes of printing, preparing new editions, cost of storage, etc., are called expenses of publication. These being heavier in the photographic process, the price of the maps produced by this method is greater. Thus, whilst the total cost of map-making has been largely reduced by the introduction of photozincography, the nation getting more work for the same money, the selling price of the maps has been raised 60 per cent. A system which can produce such an absurd result as this is surely in need of reform.

So far as the great cadastral map is concerned, there is no ground for complaint; it fully answers all that is required in a work of that class, and is one of which the department may feel justly proud. But the very best work in maps becomes of very little value if not kept up to date. It is quite time that a permanent revision department was instituted on a liberal basis, if the great work which has been accomplished is to retain its value. Already large portions of it, and consequently the smaller scales reproduced from it, are disgracefully obsolete. The new one-inch lags so far behind that it is often obsolete before publication. Does any other nation in the world exhibit such a spectacle as a Government cartographical institution engaged in the production of obsolete maps? Again and again has this, the necessity of revision, been pointed out. Every Director-General has pressed the matter on the attention of the Government; it is dwelt on in every annual report. In 1882 the Treasury "recognised the necessity of a revision of the survey which should be constantly in progress at such a rate as would complete the whole in every fifteen years at least;" and it was not until December, 1886, that they decided to commence adding the following extraordinary memorandum:—"*It is to be clearly understood that in agreeing to the commencement of the revision they do not bind themselves to any fixed term for its completion, or to the annual provision of any fixed sum for carrying it out.*" This is the sort of thing which is absolutely fatal to the proper conduct of a department like the Ordnance Survey. It is a repetition of the indecision and blundering which have cost the country so much in the past, and to which most of the deficiencies of the survey are attributable.

It would be a good plan for the information of the map-users if this Treasury memorandum were printed in red on the margin of every sheet which has not been revised for more than fifteen years.

The cadastral map and the town plans can never be expected to have

anything but a limited sale, but they might be much more largely utilised, if the arrangements for sale and distribution were put upon a reasonable basis and measures taken to let the inhabitants of various localities know something of the state of publication in their own districts. If the six-inch and one-inch maps were better known it would probably lead to an increased sale of the larger maps. There is another and important step to be taken for the utilisation of cadastral surveys, which is pointed out by Sir Charles Wilson in his last report, namely, the compulsory use of the Ordnance Survey as the basis of valuation for local and imperial taxes and transactions affecting land.

Since Mr. Galton referred to the inaccessibility of the maps, an even worse arrangement than that in vogue at the time has been devised for the sale of the maps. In 1882 the Office of Works closed the London depot, and, notwithstanding the opposition of Colonel Stotherd, then Director-General of the Survey, abolished the agencies throughout the kingdom, handing over the business of the sale of maps to Her Majesty's Stationery Office. This transfer was made on the ground that an undivided responsibility and control would be secured, and, from the intimate relations of the Stationery Office with publishers, the sales would be increased. The Stationery Office, however, apparently had no intention of taking the responsibility, for they straightway appointed Mr. Stanford sole agent for England at 33⅓ per cent. commission, the Government to pay the cost of carriage from Southampton. In 1886 tenders were asked for a contract as sole agent for ten years on these terms. Mr. Stanford's offer of £600 per annum for the English agency was accepted. Other arrangements were entered into for sole agencies in Edinburgh and Dublin.

General Sir Henry James recommended that postmasters throughout the country should be agents, a proposal which was also advocated by Mr. Galton, but the Treasury refused to appoint postmasters. Of course no new arrangement for the sale of maps can now be entered into until the expiration of the contracts.

One of the effects of the agency monopoly is that the local retailers of the maps seldom know much about the Survey, except in cases where they were formerly agents under the old system, and it is only in the larger towns that they keep any stock. In the country it is a matter of extreme difficulty to obtain information. If a resident in Carnarvonshire or Anglesea, for example, wanted a six-inch map of his neighbourbour, and were successful in obtaining it in ten days' time, he would have shown himself to be a man of energy and resource. For the absence of an intelligible guide to its publication the department presumedly is responsible. The official catalogue is a bewildering maze. The index maps, excepting that to the one-inch, with which it is furnished, are beneath contempt. In addition to the catalogue there is published a series of Chinese puzzles, at 2d. each, called county indexes. They profess to show the sheet lines and reference numbers of the 25-inch, six-inch, and the new series one-inch scale maps, but without the assistance of a skilled interpreter are useless. Those of the counties just mentioned are fair specimens. If a would-be purchaser of some of these has finally

hazarded a guess at the number of the sheets he requires, there is nothing to indicate whether they are published or not. If he requires a one-inch map, he will, sooner or later, discover that he must get another index, the sheet lines shown on the county index referring to a map which does not exist, and which may not be published for many years to come.

Something might be done if public institutions, such as the central free libraries in our great towns, were supplied with copies of the Ordnance Survey publications of the locality, and full explanatory particulars of their objects, purposes, and the means by which copies could be obtained.

Certainly it is high time that steps were taken to remove the obstacles which interfere with the full utilisation of the Ordnance Survey. The establishment of a revision department on an adequate footing is of first importance. This can only be done by increasing the proportion of the annual grant, devoted to the revision, to a sum sufficient to clear off arrears. As the cadastral survey is now nearly complete, the expenditure under that head will rapidly diminish, so that if the total vote for the survey is maintained at its present level for a few years, the arrears of revision might be overtaken without addition to the present annual cost of the survey to the nation. That this will not be done, unless very strong representations are made to the Government, is evident from the amount of the grants of the four years since an allowance was first made for the revision and from the remarkable Treasury minute quoted above. By a thorough revision most of the defects in the maps pointed out above might be remedied, and a great national work saved from ruin for want of the proverbial ha'porth of tar.

| Year. | Total vote for Survey. | Under head of Cadastral Survey. | Under head of Revision. | Cadastral Survey and Revision together. |
|---|---|---|---|---|
| 1886-7 | £258,000 | £189,951 | £5,000 | £194,951 |
| 1887-8 | 230,000 | 149,079 | 15,000 | 164,579 |
| 1888-9 | 223,000 | 93,164 | 64,000[1] | 157,164 |
| 1889-90 | 215,000 | —— | —— | —— |

## *APPENDIX.*

### COPY OF LETTER FROM THE DIRECTOR-GENERAL OF THE ORDNANCE SURVEY TO MR. CROOK.

SOUTHAMPTON, *Sept. 2nd*, 1890.

DEAR MR. CROOK,—I have to thank you for the copy of the paper you propose to read to the British Association at Leeds, and regret that I am unable to be present to answer your criticisms more fully than by letter. All Government Departments are the better for criticism, especially when it comes from such a well-informed critic as yourself. The Ordnance Survey Department cannot,

[1] The actual amount set apart for revision is nothing like so large as here shown, the survey of Lancashire and Yorkshire on the $\frac{1}{2500}$ scale having been charged to the revision account.

however, be held responsible for the obsolete character of many of the maps or for the system under which Ordnance Survey maps are now sold to the public.

No one can be more sensible than the Director of the Survey of the pressing need for a revision of the maps; but the question is really one of money, which it is for Parliament, and not for the Department, to decide. I think you have under-estimated the pressure which has from time to time been brought to bear upon the Government to complete the 25-inch survey of Great Britain, and, however much we may regret it, we can scarcely be surprised that the survey was pushed forward at the expense of revision. The result is that in many places revision must now be virtually a re-survey.

The present system under which Ordnance Survey maps are sold by sole agents for England and Wales, Scotland, and Ireland, respectively, was adopted, as you remark, contrary to the advice of the Director of the Survey. Mr. Chaplin, however, under whom the Survey now is, stated in reply to Mr. Webb last session that "when a favourable opportunity occurred, a change in the system would be carefully considered." I believe that under a proper system the sale of the maps would be enormously increased, and exceed the sum mentioned by Sir Henry James.

I must point out one or two errors in your generally accurate paper. The 6-inch map of the kingdom was completed in March last; that of Ireland has long been completed and officially recognised as the basis for all dealings in land and for valuation for local assessment. About one-half of the 6-inch map of Ireland has been revised to date on that scale. Until recent legislation with regard to land in Ireland, the 6-inch map was considered large enough for all practical purposes by those who used it, and the necessity for a 25-inch survey has only been felt during the last few years.

I do not know what you mean by a "so-called new survey" of the northern counties. There is a "New Series" 1-inch map, so called to distinguish it from the old 1-inch map, which was not based on a large-scale survey as the new one is.

The complexity in the 1-inch map of which you complain is a matter of opinion. No country has such an enormous amount of what may be called artificial detail, buildings, roads, railroads, enclosures, etc., as England, and it is a question of taste how much of this should be shown on the 1-inch scale. We have more complaints of omissions than of want of clearness; it is impossible to please every one, and the boundaries to which you personally object are the very things which most people insist should appear on the map. They are undoubtedly found very useful, but I agree with you that they do not improve the appearance of the maps as a work of art.

With regard to price; if the 1-inch sheets were printed on an inferior paper from a transfer to zinc, as is done in France and Italy, they could be sold at 6d. each.

You are right as to the 1-inch hill sheets of the Lake District. The originals were beautiful specimens of engraving, and there was a great demand for impressions. Unfortunately the plates were worn before the present mode of preparing matrices and duplicates was perfected, and all that could be done was to arrest the disease. The plates will eventually have to be re-engraved, but this cannot be taken in hand until the new map of the south of England has been engraved. The slow progress of the publication of the new hill map is due to the difficulty of obtaining qualified engravers and of training young men to this artistic work.

I gather from your paper that one of the faults you find with the Department is that it does not construct maps for popular requirements, such as a combination

of sheets so as to give large towns like Leeds, with their environs, on a single sheet. I think that in this you are rather ignoring the principle upon which, whether rightly or wrongly, the Ordnance Survey has always been conducted. The department is directed to make maps on certain scales, which were settled after many years of controversy, for State purposes. The construction of special maps for popular use was designedly left to private enterprise, and any attempt to compete with private firms in "catering for the public" has been discouraged. I may remind you that the guide-book maps, to which you allude, are all based on the Ordnance Survey, and could not have been produced and sold at such slight cost without it. The public thus, and in many other ways, indirectly derive benefit from the great national survey.

I only received the proof of your paper this morning, and have not time to write a paper in reply, but you may read this note to the meeting, or get the Secretary to do so after your paper has been read. I have sent a few specimens of recent maps to Sir Lambert Playfair for exhibition in Section E, and enclose a specimen of the Indexes we are now publishing, which is cheap and clear enough for any one of ordinary intelligence.—Believe me, yours truly,

C. W. Wilson.

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## BRITISH ASSOCIATION, 1890.

### REPORT TO COUNCIL.

By A. Silva White, F.R.S.E.,

*Secretary, Royal Scottish Geographical Society.*

The British Association for the Advancement of Science, under the presidency of Sir Frederick Abel, held at Leeds, from the 3d to the 10th of September, its sixtieth annual meeting. The number of Members and Associates who were present fell below the average of former years; but, although some of the Section rooms attracted only small audiences, the more popular ones were fully and constantly attended. No very brilliant, original, or sensational papers were contributed; but the work in each Section was of an average value. The Association has been accustomed to hear, year by year, much the same speakers on the same subjects; and the Leeds meeting enjoyed no immunity from this infliction. But a comparatively new, and eminently satisfactory, departure from the ordinary routine was afforded by the discussions that were organised in some of the Section rooms. It is obvious that discussions on important scientific or popular subjects are more likely to attract attention, and to lead to useful results, than an infinite number of individual and distinct contributions. The Association might secure a new lease of life if the system of organised discussions were persisted in; whereas, at present, the greatest difficulty is found, under the existing conditions of literary reproduction, to secure original papers of merit. With fewer papers, carefully selected and giving rise to discussions, the Association might attract many specialists who at present prefer to patronise other platforms.

Some signs of reformation in the organisation of the Annual Meetings were apparent at Leeds. Thus, the long-vexed question of the "luncheon hour" was discussed by the Sectional Committees and the Council of the Association. The majority would seem to prefer the morning hours between ten and two o'clock for the meetings of the Sections; but in the Geographical Section at Leeds an adjournment for luncheon was made between one and two o'clock, and with satisfactory results. Uniformity of practice in this respect is, however, very desirable. The organisation of the Sectional Committees was another topic discussed. In order to reduce the committees to a reasonable size, it was proposed not to print the names of ordinary members, but only those of the chief office-bearers, in the Journals. Furthermore, it was deemed desirable that only specialists should be asked to give their services on the Sectional Committees. These and other measures of reform will, it is understood, be taken into consideration by the Council of the Association.

The invitation from the city of Edinburgh, for the Association to meet at Edinburgh in 1892, was formally renewed and most cordially received at Leeds. The deputation from the Town Council of Edinburgh consisted of Bailie Colston and Dr. Russell, and was supported by Professor Armstrong, in his private capacity, and by Dr. Haycraft, Dr. James Burgess, and myself. Next year the Association is to meet at Cardiff.

The Geographical Section is always a popular one. At Leeds the papers were few in number. The Joint Meeting between the Geographical and Economic Science Sections, to consider the subject of "The Lands of the Globe still available for European Settlement," was, undoubtedly, of distinct importance, and led to an interesting discussion. The subject was introduced in a very able paper by Mr. E. G. Ravenstein. The only other sensational meeting of the Geographical Section was on the occasion when Miss Dowie narrated her experiences in the Carpathian Mountains, during the course of an adventurous journey made this summer. The "African day" was a failure: the "discussion" followed the same lines and was directed by very much the same speakers as in former years.

The following were the office-bearers of Section E:—

### Section E.—Geography.

*President.*—Lieutenant-Colonel Sir R. Lambert Playfair, K.C.M.G., F.R.G.S.

*Vice-Presidents.*—Sir Frederic J. Goldsmid, K.C.S.I., C.B.; Sir Erasmus Ommanney, C.B., F.R.S., F.R.A.S.; E. G. Ravenstein, F.R.G.S.

*Secretaries.*—A. Barker, M.A.; John Coles, F.R.A.S., F.R.G.S.; J. Scott Keltie (*Recorder*); A. Silva White, F.R.S.E., SEC.R.S.G.S.

*Committee.*—Theodore Bent, F.R.G.S.; Dr. W. G. Blackie, F.R.G.S.; Rt. Hon. Sir George F. Bowen, G.C.M.G., D.C.L., LL.D., F.R.G.S.; Professor Flower, C.B., F.R.S., LL.D.; Sir James Kitson, Bart.; Dr. H. J. Johnston-Lavis; Dr. Hugh Robert Mill, F.R.S.E.; Dr. J. S. Phené, LL.D., F.R.G.S.; Sir Rawson W. Rawson, K.C.M.G., C.B.; Eli Sowerbutts, F.R.G.S.; Rev. Canon H. B. Tristram, F.R.S.; Cope Whitehouse.

The following is a list of the Papers read in Section E:—

*Papers read on Thursday, September 4.*

1. President's Address.—The Physical and Historical Geography of the Mediterranean.
2. *Dr. H. R. Mill.*—The Vertical Relief of the Land.
3. *Dr. H. R. Mill.*—Geographical Teaching in Russia.
4. *Sir Frederic J. Goldsmid.*—Railway Routes from Europe to India.
5. *H. F. B. Lynch.*—New Trade Routes into Persia.

*Papers read on Friday, September 5.*

1. *Dr. Kerr Cross.*—Nyassaland.
2. *Dr. Freeman.*—Ashanti.
3. *E. A. Maund.*—Zambesia and Lobengula.
4. *J. Scott Keltie.*—The Commercial Geography of Africa.
5. *A. Silva White.*—The Political Partition of Africa.
6. *E. Wilkinson.*—The Kalahari.

*Papers read on Monday, September 8th.*

1. Joint Meeting with Section F to consider the subject of The Lands of the Globe still available for European Settlement. Introduced by *E. G. Ravenstein.*
2. *Theodore Bent.*—Explorations in Cilicia.
3. Report of Committee for the Exploration of Cilicia.
4. *J. W. Wells.*—The Physical Geography of Brazil in its bearings on the Industrial Development of the Country.
5. *M. Thouar.*—Explorations in Argentina, Peru, and Bolivia.

*Papers read on Tuesday, September 9th.*

1. *Miss Mené Muriel Dowie.*—Some Notes on a Journey in the Carpathians and Ruthenia.
2. *Henry T. Crook, C.E.*—The Present State of the Ordnance Survey and the Paramount Necessity for a thorough Revision.
3. *Cope Whitehouse* and *Dr. Schlichter.*—Some points in connection with Ptolemaic Geography and Ptolemaic Maps.
4. *C. Tondini de Quarenghi.*—The Actual State of the Question of the Initial Meridian for the Universal Hour.
5. *Coutts Trotter.*—Recent Explorations in New Guinea.
6. *W. Pilcher.*—Spanish Honduras.
7. *Dr. Tempest Anderson* and *Dr. Johnston-Lavis.*—A Visit to the Skaptar district of Iceland.

Sir Lambert Playfair's Presidential Address is of such exceptional value and interest that we venture to give it *in extenso* (Appendix A). The Report of the Joint Discussion on Settleable Lands (Appendix B) has been based on the account in *The Times* of 9th September. Abstracts of some of the papers have been given (Appendix C), while other papers will appear *in extenso* in the pages of our Magazine.

The Corresponding Societies' Committee of the British Association submitted, at the first of the two meetings of the Conference of Delegates, a long report, which recorded a certain amount of work accomplished up to 1889. I attended both of the Leeds meetings, at which progress was further reported; and I must confess that, contrary to expectation, I found that distinct progress had been made, not only in the organisation of the co-operative work of the Corresponding Societies, but also in that of their various Committees. The difficulty of starting such a complicated scheme appears to have been almost overcome; it remains now to be seen in how far the Delegates may be able to promote the objects in view.

Grants by the Association in aid of scientific inquiries, either by individuals or Committees, amounted this year to as much as £1330. In regard to these grants, the following items are interesting to us:—

| | |
|---|---|
| Meteorological Observations on Ben Nevis, ... | £50 |
| Photographs of Meteorological Phenomena, ... | 5 |
| Seasonal Variations of Temperature, ... ... | 20 |
| Erratic Boulders, ... ... ... ... | 10 |
| Photographs of Geological Interest, ... ... | 10 |
| Volcanic Phenomena of Vesuvius, ... ... ... | 10 |
| Underground Waters, ... ... ... ... | 5 |
| Disappearance of Native Plants, ... ... ... | 5 |
| Zoology of the Sandwich Islands, ... ... ... | 100 |
| Zoology and Botany of the West India Islands, ... | 100 |
| Nomad Tribes of Asia Minor and Northern Persia, ... | 30 |
| Action of Waves and Currents in Estuaries, ... | 150 |
| North-Western Tribes of Canada, ... ... ... | 200 |
| Habits of Natives of India, ... ... ... | 10 |

Committees were also appointed to deal with the following, among other subjects not involving grants of money:—Meteoric dust, underground temperatures, solar radiation, erosion of sea-coasts, earth-tremors, migration of birds, teaching in science, etc.

Certain Resolutions from the Sectional Committees were referred to the Council to be further dealt with. They included the following:—"That the Council should consider whether grants should not be made for other than specific researches by specified individuals"; "That the Council should watch the operation of Acts relating to technical and scientific instruction"; "That greater facilities should be afforded to the public for the purchase of the Ordnance Survey maps"; "That it were desirable there should be a more full and expeditious publication of papers, with reports of discussions on them"; "That the Journal should be simplified by separating the programme from the record, and both from the list of officers"; "That it were desirable to fix the meetings two years in advance, and to bear in mind that the latter end of September is the most convenient time"; and "That it were desirable to provide an index to reports of committees."

APPENDIX *A*.—

# APPENDIX *A*.

## Presidential Address to Section E.

By Lieutenant-Colonel Sir Lambert Playfair, K.C.M.G.,
*H.M. Consul-General in Algeria,*

on

## THE MEDITERRANEAN, PHYSICAL AND HISTORICAL.

When the unexpected honour was proposed to me of presiding over your deliberations, I felt some embarrassment as to the subject of my address. Geography as a science, and the necessity of encouraging a more systematic study of it, had been treated in an exhaustive manner during previous meetings. The splendid discoveries of Stanley and the prolonged experiences of Emin have been amply illustrated by the personal narrative of the former. The progress of geography during the past year has been fully detailed in the annual address of the President of the Royal Geographical Society in June last; so that it would be a vain and presumptuous endeavour for me to compress these subjects into the limits of an opening address. Closely connected with them are the magnificent experiments for opening out Africa which are being made by our merchant princes, amongst whom the name of Sir William Mackinnon stands pre-eminent, and by our Missionary Societies of various Churches, all acting cordially in unison, and sinking, in the Dark Continent, the differences and heartburnings which divide Christianity at home; I have thought it better, however, not to discuss matters so closely connected with political questions which have not yet passed into the realm of history.

In my perplexity I applied for the advice of one of the most experienced geographers of our Society, whose reply brought comfort to my mind. He reminded me that it was generally the custom for Presidents of Sections to select subjects with which they were best acquainted, and added: "What more instructive and captivating subject could be wished than The Mediterranean, Physical and Historical"?

For nearly a quarter of a century I have held an official position in Algeria, and it has been my constant delight to make myself acquainted with the islands and shores of the Mediterranean, in the hope of being able to facilitate the travels of my countrymen in that beautiful part of the world.

I cannot pretend to throw much new light on the subject, and I have written so often about it already that what I have to say may strike you as a twice-told tale; nevertheless, if you will permit me to descend from the elevated platform occupied by more learned predecessors, I should like to speak to you in a familiar manner of this "Great Sea," as it is called in sacred Scripture, the *Mare Internum* of the ancients, "our sea" (*Mare nostrum*) of Pomponius Mela.

Its shores include about three million square miles of the richest country on the earth's surface, enjoying a climate where the extremes of temperature are unknown, and with every variety of scenery, but chiefly consisting of mountains and elevated plateaux. It is a well-defined region of many parts, all intimately connected with each other by their geographical character, their geological formation, their flora, fauna, and the physiognomy of the people who inhabit them. To this general statement there are two exceptions, namely, Palestine, which belongs

rather to the tropical countries lying to the east of it, and so may be dismissed from our subject, and the Sahara, which stretches to the south of the Atlantic region—or region of the Atlas—but approaches the sea at the Syrtis, and again to the eastward of the Cyrenaica, and in which Egypt is merely a long oasis on either side of the Nile.

The Mediterranean region is the emblem of fertility and the cradle of civilisation, while the Sahara—Egypt, of course, excepted—is the traditional panther's skin of sand, dotted here and there with oases, but always representing sterility and barbarism. The sea is in no sense, save a political one, the limit between them; it is a mere gulf, which, now bridged by steam, rather unites than separates the two shores. Civilisation never could have existed if this inland sea had not formed the junction between the three surrounding continents, rendering the coasts of each easily accessible whilst modifying the climate of its shores.

The Atlas range is a mere continuation of the south of Europe. It is a long strip of mountain land, about 200 miles broad, covered with splendid forests, fertile valleys, and in some places arid steppes, stretching eastward from the ocean to which it has given its name. The highest point is in Morocco, forming a pendant to the Sierra Nevada of Spain; thence it runs, gradually decreasing in height, through Algeria and Tunisia; it becomes interrupted in Tripoli, and it ends in the beautiful green hills of the Cyrenaica, which must not be confounded with the oases of the Sahara, but is an island detached from the eastern spurs of the Atlas, in the ocean of the desert.

In the eastern part the flora and fauna do not essentially differ from those of Italy; in the west they resemble those of Spain; one of the noblest of the Atlantic conifers, the *Abies pinsapo*, is found also in the Iberian penisula and nowhere else in the world, and the valuable alfa grass or esparto (*Macrochloa tenacissima*), from which a great part of our paper is now made, forms one of the principal articles of export from Spain, Portugal, Morocco, Algeria, Tunisia, and Tripoli. On both sides of the sea the former plant is found on the highest and most inaccessible mountains, amongst snows which last during the greater part of the year, and the latter from the sea level to an altitude of 5000 feet, but in places where the heat and drought would kill any other plant, and in undulating land where water cannot lodge.

Of the three thousand plants found in Algeria by far the greater number are natives of Southern Europe, and less than a hundred are peculiar to the Sahara. The *macchie* or *maquis* of Algeria in no way differs from that of Corsica, Sardinia, and other places; it consists of lentisk, arbutus, myrtle, cistus, tree-heath, and other Mediterranean shrubs. If we take the commonest plant found on the southern shores of the Mediterranean, the dwarf palm (*Chamærops humilis*), we see at once how intimately connected is the whole Mediterranean region, with the exception of the localities I have before indicated. This palm still grows spontaneously in the south of Spain and in some parts of Provence, in Corsica, Sardinia and the Tuscan Archipelago, in Calabria and the Ionian Islands, on the continent of Greece, and in several of the islands in the Levant, and it has only disappeared from other countries as the land has been brought under regular cultivation. On the other hand, it occurs neither in Palestine, Egypt, nor in the Sahara.

The presence of European birds may not prove much, but there are mammalia, fish, reptiles, and insects common to both sides of the Mediterranean. Some of the larger animals, such as the lion, panther, jackal, etc., have disappeared before the march of civilisation in the one continent, but have lingered, owing to Mohammedan barbarism, in the other. There is abundant evidence of the former existence of these and of the other large mammals, which now characterise tropical

Africa, in France, Germany, and Greece: it is probable that they only migrated to their present habitat after the upheaval of the great sea which in Eocene times stretched from the Atlantic to the Indian Ocean, making Southern Africa an island continent like Australia. The original fauna of Africa, of which the lemur is the distinctive type, is still preserved in Madagascar, which then formed part of it.

The fish fauna is naturally the most conclusive evidence as to the true line of separation between Europe and Africa. We find the trout in the Atlantic region and in all the snow-fed rivers falling into the Mediterranean; in Spain, Italy, Dalmatia; it occurs in Mount Olympus, in rivers of Asia Minor, and even in the Lebanon, but nowhere in Palestine south of that range, in Egypt, or in the Sahara. This fresh-water salmonoid is not exactly the same in all these localities, but is subject to considerable variation, sometimes amounting to specific distinction. Nevertheless it is a European type found in the Atlas, and it is not till we advance into the Sahara, at Tuggurt, that we come to a purely African form in the *Chromides*, which have a wide geographical distribution, being found everywhere between that place, the Nile and Mozambique.

The presence of newts, tailed batrachians, in every country round the Mediterranean, except again in Palestine, Egypt, and the Sahara, is another example of the continuity of the Mediterranean fauna, even though the species are not the same throughout.

The Sahara is an immense zone of desert which commences on the shores of the Atlantic Ocean, between the Canaries and Cape de Verde, and traverses the whole of North Africa, Arabia, and Persia, as far as Central Asia. The Mediterranean portion of it may be said roughly to extend between the 15th and 30th degrees of north latitude.

This was popularly supposed to have been a vast inland sea in very recent times, but the theory was supported by geological facts wrongly interpreted. It has been abundantly proved by the researches of travellers and geologists that such a sea was neither the cause nor the origin of the Libyan Desert.

Rainless and sterile regions of this nature are not peculiar to North Africa, but occur in two belts which go round the world in either hemisphere, at about similar distances north and south of the equator. They correspond in locality to the great inland drainage areas from which no water can be discharged into the ocean, and which occupy about one-fifth of the total land surface of the globe.

The African Sahara is by no means a uniform plain, but forms several distinct basins containing a considerable extent of what may almost be called mountain land. The Hogar mountains in the centre of the Sahara are 7000 feet high, and are covered during three months with snow. The general average may be taken at 1500 feet. The physical character of the region is very varied; in some places, such as at Toout, Moghrar, Touat, and other oases in or bordering on Morocco, there are well-watered valleys, with fine scenery and almost European vegetation, where the fruits of the north flourish side by side with the palm-tree. In others there are rivers like the Oued Guir, an affluent of the Niger, which the French soldiers, who saw it in 1870, compared to the Loire. Again, as in the bed of the Oued Rir, there is a subterranean river, which gives a sufficient supply of water to make a chain of rich and well-peopled oases equal in fertility to some of the finest portions of Algeria. The greater part of the Sahara, however, is hard and undulating, cut up by dry watercourses, such as the Igharghar, which descends to the Chott Melrihr, and almost entirely without animal or vegetable life.

About one-sixth of its extent consists of dunes of moving sand, a vast accumulation of detritus washed down from more northern and southern regions—perhaps

during the glacial epoch—but with no indication of marine formation. These are difficult and even dangerous to traverse, but they are not entirely destitute of vegetation. Water is found at rare but well-known intervals, and there is an abundance of salsolaceous plants which serve as food for the camel. This sand is largely produced by wind action on the underlying rocks, and is not sterile in itself; it is only the want of water which makes it so. Wherever water does exist, or artesian wells are sunk, oases of great fertility never fail to follow.

Some parts of the Sahara are below the level of the sea, and here are formed what are called *chotts* or *sebkhas*, open depressions without any outlets, inundated by torrents from the southern slopes of the Atlas in winter and covered with a saline efflorescence in summer. This salt by no means proves the former existence of an inland sea; it is produced by the concentration of the natural salts, which exist in every variety of soil, washed down by winter rains, with which the unevaporated residue of water becomes saturated.

Sometimes the drainage, instead of flooding open spaces and forming *chotts*, finds its way through the permeable sand till it meets impermeable strata below it, thus forming vast subterranean reservoirs where the artesian sound daily works as great miracles as did Moses' rod of yore at Meribah. I have seen a column of water thrown up into the air equal to 1300 cubic mètres per diem; a quantity sufficient to redeem 1800 acres of land from sterility and to irrigate 60,000 palm-trees. This seems to be the true solution of the problem of an inland sea; a sea of verdure and fertility caused by the multiplication of artesian wells, which never fail to bring riches and prosperity in their train.

The climate of the Sahara is quite different from that of what I have called the Mediterranean region, where periodical rains divide the year into two seasons. Here, in many places, years elapse without a single shower; there is no refreshing dew at night, and the winds are robbed of their moisture by the immense continental extents over which they blow. There can be no doubt that it is to these meteorological, and not to geological, causes that the Sahara owes its existence.

Réclus divides the Mediterranean into two basins, which, in memory of their history, he calls the Phœnician and the Carthaginian, or the Greek and Roman seas, more generally known to us as the Eastern and Western Basins, separated by the island of Sicily.

If we examine the submarine map of the Mediterranean, we see that it must at one time have consisted of two enclosed or inland basins, like the Dead Sea. The western one is separated from the Atlantic by the Straits of Gibraltar, a shallow ridge, the deepest part of which is at its eastern extremity, averaging about 300 fathoms; while on the west, bounded by a line from Cape Spartel to Trafalgar, it varies from 50 to 200 fathoms. Fifty miles to the west of the Straits the bottom suddenly sinks down to the depths of the Atlantic, while to the east it descends to the general level of the Mediterranean, from one to two thousand fathoms.

The Western is separated from the Eastern Basin by the isthmus which extends between Cape Bon, in Tunisia, and Sicily, known as the "Adventure Bank," on which there is not more than from 30 to 250 fathoms. The depth between Italy and Sicily is insignificant, and Malta is a continuation of the latter, being only separated from it by a shallow patch of from 50 to 100 fathoms; while to the east and west of this bank the depth of the sea is very great. These shallows cut off the two basins from all but superficial communication.

The configuration of the bottom shows that the whole of this strait was at one time continuous land, affording free communication for land animals between

Africa and Europe. The palæontological evidence of this is quite conclusive. In the caves and fissures of Malta, amongst river detritus, are found three species of fossil elephants, a hippopotamus, a gigantic dormouse, and other animals which could never have lived in so small an island. In Sicily, remains of the existing elephant have been found, as well as the *Elephas antiquus* and two species of hippopotamus, while nearly all these and many other animals of African type have been found in the Pliocene deposits and caverns of the Atlantic region.

The rapidity with which such a transformation might have occurred can be judged by the well-known instance of Graham's Shoal, between Sicily and the island of Pantellaria; this, owing to volcanic agency, actually rose above the water in 1832, and for a few weeks had an area of 3240 feet in circumference and a height of 107 feet.

The submersion of this isthmus no doubt occurred when the waters of the Atlantic were introduced through the Straits of Gibraltar. The rainfall over the entire area of the Mediterranean is certainly not more than 30 inches, while the evaporation is at least twice as great; therefore, were the Straits to be once more closed, and were there no other agency for making good this deficiency, the level of the Mediterranean would sink again till its basin became restricted to an area no larger than might be necessary to equalise the amount of evaporation and precipitation. Thus not only would the strait between Sicily and Africa be again laid dry, but the Adriatic and Ægean Seas also, and a great part of the Western Basin.

The entire area of the Mediterranean and Black Seas has been estimated at upwards of a million square miles, and the volume of the rivers which are discharged into them at 226 cubic miles. All this and much more is evaporated annually. There are two constant currents passing through the Straits of Gibraltar, superimposed on each other; the upper and most copious one flows in from the Atlantic at the rate of nearly three miles an hour, or 140,000 cubic mètres per second, and supplies the difference between the rainfall and evaporation, while the undercurrent of warmer water, which has undergone concentration by evaporation, is continually flowing out at about half the above rate of movement, getting rid of the excess of salinity; even thus, however, leaving the Mediterranean salter than any other part of the ocean except the Red Sea.

A similar phenomenon occurs at the eastern end, where the fresher water of the Black Sea flows as a surface current through the Dardanelles, and the salter water of the Mediterranean pours in below it.

The general temperature of the Mediterranean, from a depth of 50 fathoms down to the bottom, is almost constantly 56° Fahr., whatever may be its surface elevation. This is a great contrast to that of the Atlantic, which at a similar depth is at least 3° colder, and at 1000 fathoms sinks to 40°.

This fact was of the greatest utility to Dr. Carpenter in connection with his investigations regarding currents through the Straits, enabling him to distinguish with precision between Atlantic and Mediterranean water.

For all practical purposes the Mediterranean may be accepted as being, what it is popularly supposed to be, a tideless sea, but it is not so in reality. In many places there is a distinct rise and fall, though this is more frequently due to winds and currents than to lunar attraction. At Venice there is a rise of from one to two feet in spring tides, according to the prevalence of winds up or down the Adriatic, but in that sea itself the tides are so weak that they can hardly be recognised, except during the prevalence of the Bora, our old friend Boreas, which generally raises a surcharge along the coast of Italy. In many straits and narrow arms of the sea there is a periodical flux and reflux, but the only place where tidal influence,

properly so called, is unmistakably observed is in the Lesser Syrtis, or Gulf of Gabes, where the tide runs at the rate of two or three knots an hour, and the rise and fall varies from 3 to 8 feet. It is most marked and regular at Djerba, the Homeric island of the Lotophagi: one must be careful in landing there in a boat, so as not to be left high and dry a mile or two from the shore. Perhaps the companions of Ulysses were caught by the receding tide, and it was not only a banquet of dates, the "honey-sweet fruit of the Lotus," or the potent wine which is made from it, which made them "forgetful of their homeward way."

The Gulf of Gabes naturally calls to mind the proposals which were made a few years ago for inundating the Sahara, and so restoring to the Atlantic region the insular condition which it is alleged to have had in prehistoric times. I will not allude to the English project for introducing the waters of the Atlantic from the west coast of Africa; that does not belong to my subject. The French scheme, advocated by Commandant Roudaire and supported by M. de Lesseps, was quite as visionary and impracticable.

To the south of Algeria and Tunis there exists a great depression, stretching westwards from the Gulf of Gabes to a distance of about 235 miles, in which are several *chotts* or salt lakes, sometimes only marshes, and in many places covered with a saline crust strong enough to bear the passage of camels. Commandant Roudaire proposed to cut through the isthmuses which separated the various *chotts*, and so prepare their basins to receive the waters of the Mediterranean. This done, he intended to introduce the sea by a canal, which should have a depth of one mètre below low-water level.

This scheme was based on the assumption that the basin of the *chotts* had been an inland sea within historic times; that, little by little, owing to the difference between the quantity of water which entered and the amount of evaporation and absorption, this interior sea had disappeared, leaving the *chotts* as an evidence of the former condition of things; that, in fact, this was none other than the celebrated Lake Triton, the position of which has always been a puzzle to geographers.

This theory, however, is untenable; the Isthmus of Gabes is not a mere sandbank; there is a band of rock between the sea and the basin of the *chotts*, through which the former never could have penetrated in modern times. It is much more probable that Lake Triton was the large bight between the Island of Djerba and the mainland, on the shores of which are the ruins of the ancient city of Meninx, which, to judge by the abundance of Greek marble found there, must have carried on an important commerce with the Levant.

The scheme has now been entirely abandoned; nothing but the mania for cutting through isthmuses all over the world, which followed the brilliant success achieved at Suez, can explain its having been started at all. Of course, no mere mechanical operation is impossible in these days, but the mind refuses to realise the possibility of vessels circulating in a region which produces nothing, or that so small a sheet of water in the immensity of the Sahara could have any appreciable effect in modifying the climate of its shores.

The Eastern Basin is much more indented and cut up into separate seas than the Western one; it was therefore better adapted for the commencement of commerce and navigation; its high mountains were landmarks for the unpractised sailor, and its numerous islands and harbours afforded shelter for his frail barque, and so facilitated communication between one point and another.

The advance of civilisation naturally took place along the axis of this sea, Phœnicia, Greece, and Italy being successively the great nurseries of human knowledge and progress. Phœnicia had the glory of opening out the path of ancient

commerce, for its position in the Levant gave it a natural command of the Mediterranean, and its people sought the profits of trade from every nation which had a seaboard on the three continents washed by this sea. Phœnicia was already a nation before the Jews entered the Promised Land, and, when they did so, they carried on inland traffic as middlemen to the Phœnicians. Many of the commercial centres on the shores of the Mediterranean were founded before Greece and Rome acquired importance in history. Homer refers to them as daring traders nearly a thousand years before the Christian era.

For many centuries the commerce of the world was limited to the Mediterranean, and when it extended in the direction of the East, it was the merchants of the Adriatic, of Genoa, and of Pisa who brought the merchandise of India, at an enormous cost, to the Mediterranean by land, and who monopolised the carrying trade by sea. It was thus that the elephant trade of India, the caravan traffic through Babylon and Palmyra, as well as the Arab *kafilehs*, became united with the occidental commerce of the Mediterranean.

As civilisation and commerce extended westwards, mariners began to overcome their dread of the vast solitudes of the ocean beyond the Pillars of Hercules, and the discovery of America by Columbus, and the circumnavigation of Africa by the Portuguese, changed entirely the current of trade as well as increased its magnitude, and so relegated the Mediterranean, which had hitherto been the central sea of human intercourse, to a position of secondary importance.

Time will not permit me to enter into further details regarding the physical geography of this region, and its history is a subject so vast that a few episodes of it are all that I can possibly attempt. It is intimately connected with that of every other country in the world, and here were successively evolved all the great dramas of the past and some of the most important events of less distant ages.

As I have already said, long before the rise of Greece and Rome, its shores and islands were the seat of an advanced civilisation. Phœnicia had sent out her pacific colonies to the remotest parts, and no insignificant vestiges of their handicraft still exist to excite our wonder and admiration. We have the megalithic temples of Malta sacred to the worship of Baal, the generative god, and Ashtoreth, the conceptive goddess, of the universe. The three thousand *nurhagi* of Sardinia, round towers of admirable masonry, intended probably for defence in case of sudden attack, and the so-called giant graves, were as great a mystery to classical authors as they are to us at the present day. Minorca has its *talayots*, tumuli somewhat analogous to, but of ruder construction than, the *nurhagi*, more than 200 groups of which exist in various parts of the island; with these are associated subordinate constructions intended for worship; altars composed of two immense monoliths, erected in the form of a ⊤; sacred enclosures and megalithic habitations. One type of *talayot* is especially remarkable, of better masonry than the others, and exactly resembling inverted boats. One is tempted to believe that the Phœnicians had in view the grass habitations, or *mapalia*, of the Numidians described by Sallust, and had endeavoured to reproduce them in stone: *Oblonga incurvis lateribus tecta, quasi navium carinæ sunt.*

For a long time the Phœnicians had no rivals in navigation, but subsequently the Greeks—especially the Phocians—established colonies in the Western Mediterranean, in Spain, Corsica, Sardinia, Malta, and the South of France, through the means of which they propagated not only their commerce, but their arts, literature, and ideas. They introduced many valuable plants, such as the olive, thereby modifying profoundly the agriculture of the countries in which they settled. They

have even left traces of their blood, and it is no doubt to this that the women of Provence owe the classical beauty of their features.

But they were eclipsed by their successors. The empire of Alexander opened out a road to India, in which, indeed, the Phœnicians had preceded him, and introduced the produce of the East into the Mediterranean ; while the Tyrian colony of Carthage became the capital of another vast empire, which, from its situation, midway between the Levant and the Atlantic Ocean, enabled it to command the Mediterranean traffic.

The Carthaginians at one time ruled over territory extending along the coast from Cyrene to Numidia, besides having a considerable influence over the interior of the continent, so that the name of Africa, given to their own dominions, was gradually applied to a whole quarter of the globe. The ruling passion with the Carthaginians was love of gain, not patriotism, and their wars were largely fought with mercenaries. It was the excellence of her civil constitution which, according to Aristotle, kept in cohesion for centuries her straggling possessions. A country feebly patriotic, which intrusts her defence to foreigners, has the seeds of inevitable decay, which ripened in her struggle with Rome, despite the warlike genius of Hamilkar and the devotion of the magnanimous Hannibal. The gloomy and cruel religion of Carthage, with its human sacrifices to Moloch and its worship of Baal under the name of Melcarth, led to a criminal code of Draconic severity and alienated it from surrounding nations. When the struggle with Rome began, Carthage had no friends. The first Punic War was a contest for the possession of Sicily, whose prosperity is even now attested by the splendour of its Hellenic monuments. When Sicily was lost by the Carthaginians, so also was the dominion of the sea, which hitherto had been uncontested. The Second Punic War resulted in the utter prostration of Carthage and the loss of all her possessions out of Africa, and in 201 B.C., when this war was ended, 552 years after the foundation of the city, Rome was mistress of the world.

The destruction of Carthage after the third Punic War was a heavy blow to Mediterranean commerce. It was easy for Cato to utter his stern *Delenda est Carthago* ; destruction is easy, but construction is vastly more difficult. Although Augustus in his might built a new Carthage near the site of the old city, he could never attract again the trade of the Mediterranean which had been diverted into other channels. Roman supremacy was unfavourable to the growth of commerce, because, though she allowed unrestricted trade throughout her vast empire and greatly improved internal communications in the subjugated countries, Rome itself absorbed the greater part of the wealth and did not produce any commodities in return for its immense consumption, and therefore Mediterranean commerce did not thrive under the Roman rule. The conquest of Carthage, Greece, Egypt, and the East poured riches into Rome, and dispensed for a time with the needs of productive industry, but formed no enduring basis of prosperity.

The final partition of the Roman empire took place in 365 ; forty years later the barbarians of the North began to invade Italy and the South of Europe, and in 429 Genseric, at the head of his Vandal hordes, crossed over into Africa from Andalusia, a province which still bears their name, devastating the country as far as the Cyrenaica. He subsequently annexed the Balearic Islands, Corsica, and Sardinia ; he ravaged the coasts of Italy and Sicily, and even of Greece and Illyria ; but the most memorable of his exploits was the unresisted sack of Rome, whence he returned to Africa laden with treasure and bearing the Empress Eudoxia a captive in his train.

The degenerate emperors of the West were powerless to avenge this insult, but

Byzantium, though at this time sinking to decay, did make a futile attempt to attack the Vandal monarch in his African stronghold. It was not, however, till 533, in the reign of Justinian, when the successors of Genseric had fallen into luxurious habits and had lost the rough valour of their ancestors, that Belisarius was able to break their power and take their last king a prisoner to Constantinople. The Vandal domination in Africa was destroyed, but that of the Byzantines was never thoroughly consolidated ; it rested, not on its own strength, but on the weakness of its enemies, and it was quite unable to cope with the next great wave of invasion which swept over the land, perhaps the most extraordinary event in the world's history, save only the introduction of Christianity.

In 647, twenty-seven years after the Hedjira of Mohammed, Abdulla ibn Saad started from Egypt for the conquest of Africa with an army of 40,000 men.

The expedition had two determining causes—the hope of plunder and the desire to promulgate the religion of El Islam. The sands and scorching heat of the desert, which had nearly proved fatal to the army of Cato, were no bar to the hardy Arabians and their enduring camels. The march to Tripoli was a fatiguing one, but it was successfully accomplished ; the invaders did not exhaust their force in a vain effort to reduce its fortifications, but swept on over the Syrtic desert and north to the province of Africa, where, near the splendid city of Suffetula, a great battle was fought between them and the army of the Exarch Gregorius, in which the Christians were signally defeated, their leader killed, and his daughter allotted to Ibn ez-Zobair, who had slain her father.

Not only did the victorious Moslems overrun north Africa, but soon they had powerful fleets at sea which dominated the entire Mediterranean, and the emperors of the East had enough to do to protect their own capital.

Egypt, Syria, Spain, Provence, and the islands of the Mediterranean successively fell to their arms, and, until they were checked at the Pyrenees by Charles Martell it seemed at one time as if the whole of Southern Europe would have been compelled to submit to the disciples of the new religion. Violent, implacable, and irresistible at the moment of conquest, the Arabs were not unjust or hard masters in countries which submitted to their conditions. Every endeavour was, of course, made to proselytise, but Christians were allowed to preserve their religion on payment of a tax, and even Popes were in the habit of entering into friendly relations with the invaders. The Church of St. Cyprian and St. Augustine, with its 500 Sees, was indeed expunged, but five centuries after the passage of the Mohammedan army from Egypt to the Atlantic a remnant still existed. It was not till the twelfth century that the religion and language of Rome became utterly extinguished.

The Arabs introduced a state of high civilisation into the countries where they settled ; their architecture is the wonder and admiration of the world at the present day ; their irrigational works in Spain have never been improved upon ; they fostered literature and the arts of peace, and introduced a system of agriculture far superior to what existed before their arrival.

Commerce, discouraged by the Romans, was highly honoured by the Arabs, and during their rule the Mediterranean recovered the trade which it possessed in the time of the Phœnicians and Carthaginians ; it penetrated into the Indian Archipelago and China ; it travelled westward to the Niger, and to the east as far as Madagascar, and the great trade route of the Mediterranean was once more developed.

The power and prosperity of the Arabs culminated in the ninth century, when Sicily fell to their arms ; it was not, however, very long before their empire began

to be undermined by dissensions; the temporal and spiritual authority of the Ommiade Khalifs, which extended from Sind to Spain, and from the Oxus to Yemen, was overthrown by the Abbassides in the year 132 of the Hedjira, A.D. 750. Seven years later Spain detached itself from the Abbasside empire; a new Khaliphate was established at Cordova, and hereditary monarchies began to spring up in other Mohammedan countries.

The Carlovingian empire gave an impulse to the maritime power of the South of Europe, and in the Adriatic the fleets of Venice and Ragusa monopolised the traffic of the Levant. The merchants of the latter noble little republic penetrated even to our own shores, and Shakespeare has made the Argosy or Ragusie a household word in our language.

During the eleventh century the Christian Powers were no longer content to resist the Mohammedans; they began to turn their arms against them. If the latter ravaged some of the fairest parts of Europe, the Christians began to take brilliant revenge.

The Mohammedans were driven out of Corsica, Sardinia, Sicily, and the Balearic Islands, but it was not till 1492 that they had finally to abandon Europe after the conquest of Granada by Ferdinand and Isabella.

About the middle of the eleventh century an event took place which profoundly modified the condition of the Mohammedan world. The Khaliph Mostansir let loose a horde of nomad Arabs, who, starting from Egypt, spread over the whole of North Africa, carrying destruction and blood wherever they passed, thus laying the foundation for the subsequent state of anarchy which rendered possible the interference of the Turks.

English commercial intercourse with the Mediterranean was not unknown even from the time of the Crusades, but it does not appear to have been carried on by means of our own vessels till the beginning of the sixteenth century. In 1522 it was so great that Henry VIII. appointed a Cretan merchant, Censio de Balthazari, to be "Master, governor, protector, and consul of all and singular the merchants and others his lieges and subjects within the port, island, and country of Crete or Candia." This is the very first English consul known to history, but the first of English birth was my own predecessor in office, Master John Tipton, who, after having acted at Algiers during several years in an unofficial character, probably elected by the merchants themselves to protect their interests, was duly appointed consul by Sir William Harebone, ambassador at Constantinople in 1585, and received just such an exequatur from the Porte as has been issued to every consul since by the government of the country in which he resides.

Piracy has always been the scourge of the Mediterranean, but we are too apt to associate its horrors entirely with the Moors and Turks. The evil had existed from the earliest ages; even before the Roman conquest of Dalmatia the Illyrians were the general enemies of the Adriatic; Africa under the Vandal reign was a nest of the fiercest pirates; the Venetian chronicles are full of complaints of the ravages of the corsairs of Ancona, and there is no other name but piracy for such acts of the Genoese as the unprovoked pillage of Tripoli by Andrea Doria in 1535. To form a just idea of the corsairs of the past it is well to remember that commerce and piracy were often synonymous terms, even among the English, up to the reign of Elizabeth. Listen to the description given by the pious Cavendish of his commercial circumnavigation of the globe: "It hath pleased Almighty God to suffer me to circumpass the whole globe of the world. . . . I navigated along the coast of Chili, Peru, and New Spain, where I made great spoils. All the villages and towns that ever I landed at I burned and spoiled, and had I not been discovered

upon the coast I had taken a great quantity of treasure," and so he concludes, "The Lord be praised for all His mercies!"

Sir William Monson, when called upon by James I. to propose a scheme for an attack on Algiers, recommended that all the maritime powers of Europe should contribute towards the expense, and participate in the gains from the sale of Moors and Turks as slaves.

After the discovery of America and the expulsion of the Moors from Spain, piracy developed to an extraordinary extent. The audacity of the Barbary corsairs seems incredible at the present day; they landed on the shores and islands of the Mediterranean, and even extended their ravages to Great Britain, carrying off all the inhabitants whom they could seize into the most wretched slavery. The most formidable of these piratical states was Algiers, a military oligarchy, consisting of a body of janissaries, recruited by adventurers from the Levant, the outcasts of the Mohammedan world, criminals and renegades from every nation in Europe. They elected their own ruler or Dey, who exercised despotic sway, tempered by frequent assassination; they oppressed without mercy the natives of the country, accumulated vast riches, had immense numbers of Christian slaves, and kept all Europe in a state bordering on subjection by the terror which they inspired. Nothing is sadder or more inexplicable than the shameful manner in which this state of things was accepted by civilised nations. Many futile attempts were made during successive centuries to humble their arrogance, but it only increased by every manifestation of the powerlessness of Europe to restrain it. It was reserved for our own countryman, Lord Exmouth, by his brilliant victory in 1816, for ever to put an end to piracy and Christian slavery in the Mediterranean. His work, however, was left incomplete, for though he destroyed the navy of the Algerines, and so rendered them powerless for evil on the seas, they were far from being humbled; they continued to slight their treaties and to subject even the agents of powerful nations to contumely and injustice. The French took the only means possible to destroy this nest of ruffians, by the almost unresisted occupation of Algiers and the deportation of its Turkish aristocracy.

They found the whole country in the possession of a hostile people, some of whom had never been subdued since the fall of the Roman Empire, and the world owes France no small debt of gratitude for having transformed what was a savage and almost uncultivated country into one of the richest as well as the most beautiful in the basin of the Mediterranean.

What has been accomplished in Algeria is being effected in Tunisia. The treaty of the Kasr-es-Saeed, which established a French Protectorate there, and the military occupation of the Regency, were about as high-handed and unjustifiable acts as are recorded in history; but there can be no possible doubt regarding the important work of civilisation and improvement that has resulted from them. European courts of justice have been established all over the country; the exports and imports have increased from 23 to 51 millions of francs, the revenue from 6 to 19 millions, without the imposition of a single new tax, and nearly half a million per annum is being spent on education.

Sooner or later the same thing must happen in the rest of North Africa, though at present international jealousies retard this desirable consummation. It seems hard to condemn such fair countries to continued barbarism, in the interest of tyrants who misgovern and oppress their people. The day cannot be far off when the whole southern shores of the Mediterranean will enjoy the same prosperity and civilisation as the northern coast, and when the deserts, which are the result of misgovernment and neglect, will assume the fertility arising from security and industry, and will again blossom as the rose.

It cannot be said that any part of the Mediterranean basin is still unknown, if we except the empire of Morocco. But even that country has been traversed in almost every direction during the past twenty years, and its geography and natural history have been illustrated by men of the greatest eminence; such as Gerhard Rohlfs, Monsieur Tissot, Sir Joseph Hooker, the Vicomte de Foucauld, Joseph Thomson, and numerous other travellers. The least-known portion, at least on the Mediterranean coast, is the Riff country, the inhospitality of whose inhabitants has given the word "ruffian" to the English language. Even that has been penetrated by De Foucauld disguised as a Jew, and the record of his exploration is one of the most brilliant contributions to the geography of the country which has hitherto been made.

Although, therefore, but little remains to be done in the way of actual exploration, there are many by-ways of travel comparatively little known to that class of the community with which I have so much sympathy, the ordinary British tourist. These flock every year in hundreds to Algeria and Tunis, but few of them visit the splendid Roman remains in the interior of those countries. The Cyrenaica is not so easily accessible, and I doubt whether any Englishmen have travelled in it since the exploration of Smith and Porcher in 1861.

Cyrene almost rivalled Carthage in commercial importance. The Hellenic ruins still existing bear witness to the splendour of its five great cities. It was the birthplace of many distinguished people, and amongst its hills and fountains were located some of the most interesting scenes in mythology, such as the Gardens of the Hesperides and the "Silent, dull, forgetful waters of Lethe."

This peninsula is only separated by a narrow strait from Greece, whence it was originally colonised. There, and indeed all over the eastern basin of the Mediterranean, are many little-trodden routes; but the subject is too extensive; I am reluctantly compelled to restrict my remarks to the western half.

The south of Italy is more frequently traversed and less travelled in than any part of that country. Of the thousands who yearly embark or disembark at Brindisi, few ever visit the Land of Manfred. Otranto is only known to them from the fanciful descriptions in Horace Walpole's romance. The general public in this country is quite ignorant of what is going on at Taranto and of the great arsenal and dockyard which Italy is constructing in the Mare Piccolo, an inland sea containing more than 1000 acres of anchorage for the largest ironclads afloat, yet with an entrance so narrow that it is spanned by a revolving bridge. Even the Adriatic, though traversed daily by steamers of the Austrian Lloyd's Company, is not a highway of travel; yet where is it possible to find so many places of interest within the short space of a week's voyage, as between Corfu and Trieste, along the Dalmatian and Istrian shores, and among the islands that fringe the former, where it is difficult to realise that one is at sea at all, and not on some great inland lake?

There is the Bocche di Cattaro, a vast rent made by the Adriatic among the mountains, where the sea flows round their spurs in a series of canals, bays, and lakes of surpassing beauty. The city of Cattaro itself, the gateway of Montenegro, with its picturesque Venetian fortress, nestling at the foot of the black mountain; Ragusa, the Roman successor of the Hellenic Epidaurus, Queen of the Southern Adriatic, battling with the waves on her rock-bound peninsula, the one spot in all that sea which never submitted either to Venice or the Turk, and for centuries resisted the barbarians on every side, absolutely unique as a mediæval fortified town, and worthy to have given her name to the argosies she sent forth; Spalato, the grandest of Roman monuments; Lissa, colonised by Dionysius of Syracuse, and memorable to us as having been a British naval station from 1812 to 1814, while

the French held Dalmatia; Zara, the capital, famous for its siege by the Crusaders, interesting from an ecclesiological point of view, and venerated as the last resting-place of St. Simeon, the prophet of the *Nunc dimittis*; Parenza, with its great basilica; Pola, with its noble harbour, whence Belisarius sailed forth, now the chief naval port of the Austrian empire, with its Roman amphitheatre and graceful triumphal arches; besides many other places of almost equal interest. Still further west are Corsica, Sardinia, and the Balearic Islands, all easily accessible from the coasts of France, Italy, and Spain. Their ports are constantly visited by mail steamers and private yachts, yet they are but little explored in the interior.

I am tempted to linger a little over one of the places I have just mentioned, and to devote more time to a physical and historical description of Corsica than I can spare for the Mediterranean generally. It is replete with all that makes travel delightful—unequalled scenery, a brilliant climate, historical associations, and the study of a race of men who still retain their national peculiarities. The facilities for travelling are as great as can be fairly expected; roads such as none but the French seem able to make, winding along steep coasts and over high mountains, plunging into the depths of shady valleys and amongst dark forests in search of what is so dear to a French engineer's heart, a uniform gradient, and metalled with granite so hard that in the driest weather they are free from dust. I may add that I never failed to find sufficiently good accommodation and a kindly reception in the smallest and most remote villages.

Corsica has been compared in shape to a closed hand with the index finger extended, the latter being the promontory, called Cap Corse. The island is traversed in its whole length by a chain of high mountains, the general direction of which is north and south, dividing it into two parts of nearly equal extent. Placed, as it is, in the centre of the Western Mediterranean, between the Alps and the Atlas, and with so great inequalities of surface, it presents an epitome of the whole region from the warm sea-level to the Alpine character of the interior, where the mountains rise to a height of nearly 9000 feet, and are clothed in snow during the greater part of the year.

All the western coast, and more than two-thirds of the whole island, are of granitic formation. The central range throws out spurs towards the sea, forming on the western side numerous bays of considerable size and depth. Nothing can exceed the grandeur of the scenery on the coast, which culminates in the celebrated Calanches de Piana, a succession of stupendous granite rocks worn and hollowed out in the most fantastic manner, fearful in their forms but soft and lovely in their colouring. There are many similar rocks throughout the island, such as the Calanches d'Evisa, the Fourches d'Asinao, and the Gorge of Inzeca, where a river flows between great cliffs and amongst boulders of green serpentine, a sight never to be forgotten.

The eastern side of the island consists of primary rocks, more or less easily disintegrated, the detritus being washed down by rains so as to form the low plains bordering that coast. As the rivers force their way through them with difficulty, marshes and lagoons are created. These are hotbeds of malarious fever in summer, dangerous even for the natives, who migrate to the hills at that season.

The forests, the great glory of the island, consist chiefly of oak, beech, birch, and the *Pinus laricio*, indigenous to Corsica, and the monarch of European conifers, which rises as straight as an arrow, sometimes to a height of 120 or 150 feet.

The Castagniccia, or country of the chestnut, is an extensive and very beautiful district, especially when the trees are in full leaf. The fruit is more useful to the people who inhabit the district than even the date to the Arab. He has to cultivate his palm-trees laboriously, irrigate them in summer, and pick the fruit with

the greatest care. The chestnut demands no such attention ; it grows spontaneously, requires no cultivation, and the fruit falls of itself when sufficiently ripe. It is the staple food of the people, who eat it in every form, even giving it to their cattle instead of grain, while the sale of the surplus furnishes them with the other necessaries of life.

After the forests the most pleasing feature in the island, and covering more than half its surface, is the *macchie*, or brushwood, before mentioned, spreading its delicious perfume through the air and lighting up the landscape with a blaze of colour. There is also a constant succession of wild-flowers, liliaceous plants, orchids, cyclamen, and many others. In one pine wood I saw the ground carpeted with violets and primroses, while ferns, from the common bracken to the noble *Osmunda regalis*, are found everywhere.

The principal towns are Ajaccio on the south-west, a well-known winter station, the capital of the island, full of memories and memorials of Napoleon ; Bastia to the north-east, the commercial capital ; Calvi to the north-west, a picturesque stronghold rising high above the sea, and dominating the surrounding country. The last is one of the few places that were always faithful to the Genoese cause, and it still bears over the entrance gate the inscription, *Civitas Calvi semper fidelis*. It made a desperate resistance to the English in 1794 under Hood and Nelson, who reduced it almost to a heap of ruins before it surrendered. Nelson lost his eye in the engagement. A local antiquary has tried to prove that Columbus was born here, of Genoese parents, though he left at an early age for Genoa.

Corte, in the interior of the island, the ancient feudal capital, was the chief seat of Paoli's government, as well as the headquarters of the short-lived English administration under Sir Gilbert Elliot. It is situated at the confluence of two rivers, the Restonico and the Tavignano, which descend to the plains through a series of magnificent gorges. High above the town, perched on the summit of a rock, is the picturesque citadel built in the beginning of the fifteenth century.

In the extreme south is Bonifacio, another ancient fortress, not only strange and beautiful in itself, but commanding fine views from its ramparts of Sardinia and the numerous islands on both sides of the Straits.

Carghese, 28 miles north of Ajaccio, is exceptionally interesting. In 1676 an emigration of about 1000 Greeks from Maina, in the Morea, wearied with Turkish oppression, took place to Genoa, whence they were sent to Corsica. A second emigration of 400 started to join them in the following year, but they were overtaken by the Turkish fleet and massacred. The prosperity of the small colony was not of long duration, because, when the insurrection in Corsica against the Genoese broke out, the Greeks, out of gratitude to their protectors, refused to join in it. In consequence their villages were destroyed, their lands confiscated, and their flocks driven away. They fled for refuge to Ajaccio, and there remained till the advent of the French. It was one of the first acts of Comte Marbeuf, on assuming the government of the island, to reinstate them in a new domain, and he it was who built the present town of Carghese. The inhabitants, though in full communion with the Church of Rome, still retain their Greek Liturgy, and to some extent their language, and live on the most cordial terms with their Latin neighbours.

The vendetta has always been one of the characteristic customs of Corsica, although prevailing more in some parts of the island than in others. Such feuds have been pursued with inveterate pertinacity, frequently involving whole families from one generation to another. The custom originated in times when Genoese justice was venal and corrupt, and men had to take the honour of their families

into their own keeping. After having accomplished their vendetta, the "bandits, as they are called, are accustomed to take refuge in the *macchie*, but they are never to be confounded with robbers, and there is no instance of strangers being molested by them.

Corsica has an important ancient history, but time will not permit me to enter into this subject in any detail; one episode, however, is especially interesting. Seneca passed eight years here in exile: a tower is pointed out on the west coast of Cap Corse which is said to have served as his prison. Even the glorious views of sea and land which it commands could not compensate him for compulsory banishment from the fertile plains of Italy.

Nor is this the place even to summarise the modern history of the island, though nothing can be more interesting than the story of the Pisan domination, the long and tyrannical rule of the Genoese, the struggle of the islanders during four centuries to gain their independence, the mock kingdom of Theodore, the wise rule of Pasquale Paoli, the unfortunate English occupation, and the subsequent conquest of the island by France.

I have endeavoured to sketch, necessarily in a very imperfect manner, the physical character and history of the Mediterranean, to show how the commerce of the world originated in a small maritime state at its eastern extremity; how it gradually advanced westward till it burst through the Straits of Gibraltar, and extended over seas and continents until then undreamt of, an event which deprived the Mediterranean of that commercial prosperity and greatness which for centuries had been limited to its narrow basin.

Once more this historic sea has become the highway of nations; the persistent energy and genius of two men have revolutionised navigation, opened out new and boundless fields for commerce, and it is hardly too much to say that if the Mediterranean is to be restored to its old position of importance, if the struggle for Africa is to result in its regeneration, as happened in the new world, if the dark places still remaining in the further East are to be civilised, it will be in a great measure due to Waghorn and Ferdinand de Lesseps, who developed the overland route and created the Suez Canal.

But the Mediterranean can only hope to retain its regenerated position in time of peace. Nothing is more certainly shown by past history than that war and conquest have changed the route of commerce in spite of favoured geographical positions. Babylon was conquered by Assyrians, Persians, Macedonians, and Romans, and though for a time her position on the Euphrates caused her to rise like a phœnix from her ashes, successive conquests, combined with the luxury and effeminacy of her rulers, caused her to perish. Tyre, conquered by Nebuchadnezzar and Alexander, fell as completely as Babylon had done, and her trade passed to Alexandria. Ruined sites of commercial cities rarely again become emporia of commerce; Alexandria is an exception dependent on very exceptional circumstances.

The old route to the East was principally used by sailing vessels, and was abandoned for the shorter and more economical one by the Suez Canal, which now enables a round voyage to be made in 60 days, which formerly required from six to eight months. This, however, can only remain open in time of peace. It is quite possible that in the event of war the old route by the Cape may be again used, to the detriment of traffic by the Mediterranean. Modern invention has greatly economised the use of coal, and steamers, by the use of duplex and triplex engines, can run with a comparatively small consumption of fuel, thus leaving a larger space for cargo. England, the great carrying power of the world, may find it more advantageous to trust to her own strength and the security of the open seas

than to run the gauntlet of the numerous stragetical positions in the Mediterranean, such as Port Mahon, Bizerta, and Taranto, each of which is capable of affording impregnable shelter to a hostile fleet; and though the ultimate key to the Indian Ocean is in our own hands, our passage to it may be beset with a thousand dangers. There is no act of my career on which I look back with so much satisfaction as on the share I had in the occupation of Perim, one of the most important links in that chain of coaling stations which extends through the Mediterranean to the further East, and which is so necessary for the maintenance of our naval supremacy. It is a mere islet, it is true, a barren rock, but one surrounding a noble harbour, and so eminently in its right place that we cannot contemplate with equanimity the possibility of it being in any other hands than our own.

It is by no means certain whether exaggerated armaments are best suited for preserving peace or hastening a destructive war: the golden age of disarmament and international arbitration may not be near at hand, but it is even now talked of as a possibility.

Should the poet's prophecy or the patriot's dream be realised, and a universal peace indeed bless the world, then this sea of so many victories may long remain the harvest-field of a commerce nobler than conquest.

## APPENDIX *B*.

### Joint Meeting of the Geographical and Economic Science Sections.

In the Albert Hall, Leeds, a Conference took place between the Geographical and the Economic Science and Statistical Sections, the object being to consider the subject of "The lands of the globe still available for European settlement." Lieut.-Colonel Sir R. Lambert Playfair, President of the Geographical Section, presided.

After a few introductory words from the President, Mr. E. G. Ravenstein, in opening the discussion, remarked that the fact that there were present so large a number of distinguished economists proved that on that account geography and political economy would go hand in hand and learn from each other while acting as instructors of the public. In entering upon the subject, he had shut out from consideration those Arctic and Antarctic regions within which the growth of cereals was impossible, or next to impossible; and he had divided his area—the whole earth—into certain belts. They had first of all the Arctic region, which he left entirely out of consideration. Then they had a region within which agriculture promised best, and which included the whole of Europe, with the exception of part of Russia; and this he called the cultivable lands. The next belt was that of poorish grass lands and lands of that description, which, looked at as a whole, was less fertile than the other. And, lastly, they had the desert lands. The whole of the area within the limits of which the growth of cereals was possible comprised over 46,000,000 square miles, and out of that the fertile or comparatively fertile land covered over 28,000,000 square miles. The barren grass lands, or steppes, comprised nearly 14,000,000, and the deserts 4,180,000 square miles. In regard to the number of human inhabitants, of a very considerable part of the world they did not know the population. Of that of Africa they knew very little; and even of that of China they were not at all certain; he had therefore been obliged to go by analysis, except in those cases where he had been able to get the exact figures. He had estimated the population of the cultivable

area in the present year at 1,468,000,000. He had been exceptionally careful with regard to Africa; and he could not conscientiously give that continent more than 127,000,000—instead of the 200,000,000, or 300,000,000, or 400,000,000 which certain people would have us to believe as the correct number. Even 127,000,000 meant eleven people to the square mile; and that was a high figure. In Australia there were not 1½ to a square mile; in North America there were 14; while in South America there were only 5. In Europe they had 101 persons to the square mile. The population was densest in the western part of Europe; the land certainly was no longer able to support it, and they were obliged to send out of the country every year thousands of emigrants. He found that the population of the world increased 8 per cent. every ten years. Europe grew at the rate of 8 per cent., and he allowed for Asia an increase of 6 per cent. Africa he had given 10 per cent.; but at the present time the population there scarcely increased at all. For the purposes of his inquiry, however, he had assumed that order would be established in Africa, and that the inter-tribal wars would cease. The Slave Trade, as they knew, had been checked; compulsory migration had been put an end to; and there was even a chance of people crowding into Africa,—and possibly dying there. In Australia they found an increase of 30 per cent., which of course included immigrants; in North America 20 per cent.; and in the United States and Canada, together, 22 per cent. In South America he could only give 5 per cent., owing to the very mixed population, which was unable to rival the more strictly European elements in the northern colonies as regarded increase of population. What they wanted to know was, How long they would be allowed to continue in the improvident way they had been going on hitherto: in a word, how long the land would hold out? He had tried to arrive at an estimate; and he might say at once that the answer to the question would be subject to certain changes, say, in the standard of life. He had not the least doubt there were some vegetarians at that meeting; he could distinguish them. They would say, that if a vegetarian diet were introduced, three men might live where one lived now, and that six men might take the place of a horse. If the earth were full, he would call up a medical board, who would reduce or change their diet allowance. He would allow them porridge or other nutritious things; and if Dr. Richardson were there, no doubt he would succeed in producing some new plant that contained all the nutriment of rump-steak without compelling them to be so cruel as to kill animals, or so wasteful as to allow animals to eat grass, which they themselves ought to eat. Probably some Yorkshireman would say that they could improve the land by their methods of cultivation until it yielded a great deal more than it does now; but he rejected that point altogether. He accepted the European standard as it was now; but he did allow for a slight improvement, in view of the better harvests which they could trace in past agricultural returns. They must not, however, expect very great things from those improvements; and they must not forget that a large share of the improvements would be needed in order to give them better food than they had had hitherto. He was sure there were a good many millions of people on the face of the earth who ought to have better food than they were now able to procure. They must not expect 600 Englishmen to make a living out of a square mile, and have something left to pay for rent and clothing. That was impossible. Nor, on the other hand, did he expect that the men of the future would prove such excellent agriculturists as the American. In course of time the forests that had been destroyed in America would be recoverable, and fresh ones might be planted. In Europe even, where forests were not so necessary as in the United States, 25 per cent. were kept upon the land. As to the number of people who could be sustained in the various belts indicated, he had arrived at

the following conclusion :—To the desert regions he allocated a population of one to the square mile ; and to the poor grass lands, or steppes, he apportioned a population of ten to the square mile, on an average. Thus, in the deserts there would be 180,000, and in the steppes 139,000,000 human beings. To decide the population of the cultivable area was more difficult ; but he had taken representative areas, and had estimated their average population. In Europe he took the whole central region, from the Netherlands to the Black Sea, a region fairly well cultivated up to its capacity, though further improvements of method might be taken to equalise the amount of food exports and imports. Here there were 156 inhabitants to the square mile ; and he argued that similar areas in other parts of the world would sustain the same density of population. Taking India next, he found a population of 175 to the square mile, fairly supported, according to the prevailing mode of life. China supported a population of 295, and Japan 264, to the square mile. Taking these figures together, he arrived at the conclusion that a world-population of 207 to the square mile was a moderate estimate. Thus, the total population of the cultivable area, supposing the present standard of life to be maintained, would be 5,850,700,000, and the total number which the earth could feed was 5,994,000,000. They must not forget that their American cousins, instead of giving a lesson to Europe, had wasted their resources in a style in which Europe had never done. But these things would come right—in fact, the people would insist upon their being put right. If they travelled in America, and went south as far as Washington, they would find millions of acres that were once most productive, and were even now lovely to look upon, but nothing grew there. This land in the Eastern States, which, by the system of agriculture, was exhausted, would recover, of course. The Americans knew how to cultivate with care if they were driven to it ; and they would very soon be more careful about their land. Alluding to the question of settlement in Tropical countries, he remarked that they had heard a great deal about it. Only quite recently a Dutch doctor, at a medical congress, stated that there was absolutely no difficulty in Europeans becoming acclimatised in Tropical countries : he did not mean that Europeans could live in those countries for three, or twenty, or one hundred years, but that they and their descendants could live there for generations. That was what acclimatisation meant ; and if that were so, it had not been proved to succeed anywhere. They knew that southern races were better fitted for work in Tropical countries than were northern people. Let the Italians go to warm climates, and let us take Italy ! Who were living in France ? Did they think it was the French ? France was being occupied inch by inch by Germans and Belgians, who walked in from the north. They all desired to improve their position ; and here was this strange fact, that after a generation or so all these immigrants became Frenchmen, and some very tough Frenchmen too. Northern Frenchmen perished in Algeria ; the southern Frenchmen prospered there. The people of the Sudan were going to the south ; and the Boers in South Africa, from a comparatively healthy district, were making their way to the north. The Portuguese had gone to Brazil, but how slowly the population was increasing there ! Many returned to Portugal with fortunes, and their places were continuously being filled by others from Europe. Stop the supplies and they would die out. Perhaps, even in the United States, if they stopped the supply of European immigrants they might stop the growth of population. Unfortunately, population statistics were still very incomplete. Perhaps this was the way of Providence, to provide for the slow and painless extinction of the human race, and to prevent that over-population which people talked about. He did not think that Tropical climates were adapted to the acclimatisation of European races, in the sense in

which that word was generally used. They knew that the health of Europeans in Tropical countries had improved owing to sanitary measures; but that was not all. Mortality was still very great; and, though it had been said that out of one hundred men in the service of the Congo State only six died, he appealed to his Economic friends and asked them whether a mortality of sixty in the 1000 in the healthiest men, not one of whom had gone there without a medical certificate, was anything so very wonderful. He said no. Population in some countries did not increase; and, stranger still, where they could compare the facts collected in the same country, they found that the superior race increased at a slower rate than the inferior race. That would, in course of time, keep back the growth of population; and, in fact, the whole of mankind was being gradually lifted up to a higher level. If only the superior, not the inferior, people increased, he did not think the progress of civilisation would be quite so steady. In conclusion he remarked that, supposing the earth could sustain 5,994,000,000 people, and supposing we were improvident enough to increase at the rate of 8 per cent. each decade, how long would it be until the earth was full? He said that number would be reached in 182 years; and he thought his estimate was very moderate. The earth, if we accommodated ourselves to circumstances and conducted ourselves properly and industriously, would hold even more; but, so far as we ourselves were concerned, he did not think we need make such a tremendous fuss about that, knowing full well we would not live to see the day when there was no more room on this earth.

Professor Alfred Marshall (President of the Economic Science and Statistical Section) referred to the question of fuel, and said there were many who thought that a check upon population in the future in Temperate regions would come from the scarcity not of food but of fuel; while there were others who said, "Oh, no! a copper wire, of great thickness, right away from the Sahara to England would supply us with all the heat and all the force we shall ever require." In that case, they would see, they went beyond the geographers and required the assistance of the physicists. There was scarcely an aspect of the question of which they knew anything, and when they had found out their facts they would still be troubled with this—supposing they were careful not to over-populate, how were they to be sure that other people would be equally careful not to over-populate the world?

The President (Sir L. Playfair) expressed regret that they had not present any representative of the Imperial British East Africa Company, and read a letter which he had received from Mr. E. J. Maund:—

Mr. Maund stated that his experience in Africa showed that the prevalent idea of Tropical regions being unsuited to colonisation by Anglo-Saxons was quite mistaken. In Matabeleland, Englishmen lived for years, bringing up their children, and keeping their health. Traders, missionaries, and Dutchmen,—all were able to thrive there; and the country was well able to provide the food-supplies for a large population, as farming developments were possible to a great extent.

Sir Rawson W. Rawson said that Mr. Ravenstein had submitted to them large and general views which he thought would be profitable to those who could analyse them. No one was more capable than Mr. Ravenstein to give them an estimate of the population. He had said that the question now before them was colonisation; and he had also said that a considerable portion of the unoccupied land-area was Tropical and was not suited to Europeans. He (Sir R. Rawson) believed that the proportion of land in the different zones was as follows:—About fifty per cent. of the whole land was in the Temperate zone, about forty per cent. was in the Torrid zone, and about ten per cent. in the Arctic zone. Before going further, in dealing with a future home for the surplus population of Europe, they must ascertain

the zones that were suited to a European population. It was quite certain that the surplus population of our own country and that of the north of Europe could only occupy a Temperate zone. It was also essential that they should know how much land was available in each of the zones. The Italians, Spaniards, and French had settled in very large numbers in South America, and that was open to others. But what was to become of the surplus populations of China and India? He thought it would be necessary to make some inquiry into the matter, as to how much of each portion of the world was still available for settlement. Regarding France, he could confirm the statement that the native population had made no increase at all. It had been suggested that a request should be made that the council of the British Association appoint a committee for the purpose of investigating the matter; and another suggestion had been that it was a subject well worthy of consideration by the International Statistical Institute, of which he happened to be President. But whilst it was a subject they might well take up, he thought it was one that they (the British Association) would be much more competent to deal with themselves. The English were more interested in the matter than any other nation, and possessed means of procuring information beyond those of any other country. He hoped the result of the paper would be valuable. He believed Mr. Ravenstein's investigation would lead to very useful results for this country and others.

Mr. Stephen Bourne (of the Statistical Society) considered that Mr. Ravenstein's conclusions would dispel the absurd fears often promulgated as to the growth of the world's population. It would be unnecessary to discuss means for checking reproduction of the species. The great duty of the present time was to economise the resources of production. The present habits of acquiring and distributing wealth left room for very great improvement. The resources of the country, for instance, would be greatly enhanced by a reduction in the excessive consumption of alcoholic liquors; and Britain had yet to learn how to utilise her sewage as a fertiliser to the best advantage. Great results, too, might be expected from improved methods of cultivation and extended modes of transit. Tropical regions would be found far less unsuitable to the Saxon if the habits of life prevalent in a Temperate climate were not absurdly insisted upon in the Tropics.

Mr. John Mackenzie said experience had shown that South Africa was habitable for both the North and South European. He himself had lived within the Tropics for many years, and had seen Englishmen thrive and rear families there. The reason of this was that, north of Cape Colony, a great altitude was attained; and even in the low-lying districts of Mashonaland, where the land was cultivated and well drained, Englishmen could live well.

The Rev. Dr. Cunningham pointed out that the intensity of production might be much increased through the direction of Native labour by European intelligence. The ultimate possible total of the world's population was a fact which ought to be well borne in mind; but, in calculating it, it should be remembered that not only food-raising areas must be allowed for, but also areas for the production of necessary raw materials and fuel. The nearer the ultimate limit was approached, the greater attention would be paid to all forms of economy, and the more slowly would the growth of the population proceed.

Mr. Wells, who had spent many years in Brazil, said that there was an area in the south of Brazil which might be called the Transvaal of South America. To the north-west of Rio lay a considerable coffee-producing region, with an exceedingly healthy climate; and the productive powers of the country were very far indeed from being approximated. Owing to the influx of British capital into Argentina for the construction of railways, a great stream of emigration had set towards that

country of late years, but now that railways were being constructed in all directions in Brazil, the stream of emigration was rapidly turning thither, where a climate and soil far superior to those of Argentina were to be found. It was a curious fact that in South and Central America, as well as in the States, the people all acquired a nasal pronunciation of the language of the parent countries.

Mr. J. B. Martin, M.A., could not side altogether with Mr. Bourne and Mr. Ravenstein on the question of emigration. No scheme of emigration would suffice to raise the position of the poorer classes at home. The aim of economists must be to raise the standard of *minimum* comfort in which the population was able to live.

Dr. James Burgess, of the Archæological Survey of India, spoke of the possibilities of extending production in India and the conditions under which Europeans could live there.

Dr. J. G. Garson, secretary of the Anthropological Section, said that many people going to Tropical climates endeavoured to live in the same way as in Europe. The same amount of animal food was not needed in the Tropics as in the Temperate zones, and alcohol was less necessary, though it could not be altogether dispensed with. The question of drainage was most important; though it often occurred that the first steps towards sanitation were followed by outbreaks of fever, owing to the saturation of the soil with sewage. Elevation above the sea-level exerted a great influence on health; but the great thing for emigrants was to choose a climate as nearly as possible like that to which they were accustomed.

Dr. Freeman, speaking of the West Coast of Africa, said that that region was quite unsuitable for European colonisation. There was a terribly heavy mortality and continual ill health; and no children could possibly be reared in the country.

Mr. John Coles, F.R.A.S., secretary of the Geographical Section, said that too much might be expected of elevated plateaus. British Columbia was considered to have one of the best climates in the world; and yet, a mountain fever very much resembling yellow fever was found there. Irrigation works, too, whatever their benefits, undoubtedly produced malarial fever. It was a mistake to suppose that there was still much land available for colonisation in the Far West or the United States. Most of it was taken up in large tracts by speculators who demanded higher prices than the emigrant could pay.

Surgeon-Major John Ince maintained that there were very few spots available for colonisation by Europeans. He denied that alcohol was necessary in any degree in India.

Mr. Ravenstein, in briefly concluding the discussion, said that he was glad to find himself confirmed in several directions by men of authority. He believed that the idea of Tropical colonisation by Europeans had now been entirely dispelled, though Matabeleland might prove an exception to other Tropical countries.

## APPENDIX C.

### Abstracts of Papers read at the British Association Meeting, *Leeds, September* 1890.

*New Trade Routes into Persia.* By H. F. B. Lynch.

This paper had as its object an attempt to review the commercial geography of Southern Persia from the standpoint of the writer's experience during recent travels. A twofold consideration at once presented itself: firstly, what was the physical configuration of the country between the Persian Gulf and the Persian

plateau, and, secondly, how could we apply the results of such an inquiry to the benefit of commerce and of civilisation. Here an important element was introduced; for, given that geography had long ago decided that the present main trade route was about the worst possible, and further, that she had, within recent years, added much positive information regarding better roads, there still remained the important questions, Might commerce enter by them, and, if allowed to enter, would she be starved or fostered? This was the political element, and he would venture to offer a few remarks regarding it. The chief obstacles to the progress of commerce in Persia lay not only in the indifference of the Persian Government, but also in the apathy of the English people towards Persia and its politics. The English people had the largest interest in the foreign commerce of that Power, which was no distant neighbour of theirs in India; and, further, the value to them of its political stability was such as to merit not their apathy but their zeal. Stretching from the eastern borders of Turkey to the frontiers of Afghanistan and from the Transcaspian provinces of Russia to the Indian Ocean, Persia covered an area of 610,000 square miles—a territory five times as large as that comprised within the United Kingdom. Of this the greater portion was mountain or springless desert: enough remained of arable, of habitable, and of salubrious districts to equal or exceed the area of our islands. The political importance to us of the development of Persia as an integral state was this: it would be onerous to hold it ourselves, it would be dangerous to let others hold it, it would be advantageous if it could progress—but progress it must—under its present rulers. When the Karun River—a great navigable waterway and the only navigable river of Persia—was thrown open to commerce under certain almost prohibitive conditions, by H.M. the Shah in 1888, the prospect of improved intercourse with Persia was received with some interest by the English press. If certain restrictions could be removed, and if certain facilities were offered, it seemed likely that the new trade routes, the advantages of which our geographers had taken great pains to demonstrate, would descend from the province of theory to that of reality. This hope, in spite of the arduous labours of those who were well acquainted with the methods and habits of the East, had only been partially realised. While H.M. the Shah was being fêted by the merchants of London, the writer himself, as a traveller, was a witness of the scanty help—to say the least—which the Persian Government were extending to London merchants engaged in laborious work on the Karun. Individuals could only point out what measures it was necessary to take to facilitate commerce: our Government alone had the power to see that they were taken. A mere declaration that a river might be navigated was not tantamount to opening it to commerce. In what manner its proper navigation would affect commercial intercourse it was now his object to describe.

After some general remarks regarding th physical geography of Persia as bearing on the subject under consideration, the speaker proceeded to point out that the largest cities and the central points of attraction to commerce by the Persian Gulf were situated on the Persian plateau. Of these Ispahan contained some 80,000 and Teheran some 200,000 inhabitants. The volume of Persian trade flowed from and to the Persian Gulf by means of mule or camel transport; from the Gulf there was cheap water carriage to India and to Europe. A portion passed by the Black Sea route *viâ* Trebizond, while the rich province of Khorassan and the shores of the Caspian were enclosed within the widening zone of Russian commercial supremacy. Bushire stood at the entrance of the main avenue of the Gulf trade; thence a most difficult track led over high and precipitous passes to Shiraz; from Shiraz the way was easier towards Ispahan and Teheran. The distances along this, the principal road at present, into Persia by the Gulf, were:—

Shiraz, 200 miles ; Ispahan, 520 miles ; Teheran, 800 miles ; and the elevations—between Bushire and Shiraz a pass of 7250 feet ; between Shiraz and Ispahan, one of over 8000 feet ; between Ispahan and Teheran, the Kohrud Pass of 8750 feet. The difficulties along this road were so great that bulky goods destined for Persia were taken by river to Bagdad, and thence, after passing the barriers of a Turkish custom-house, reached the Persian plateau by the easier route *viâ* Kerrind. A glance at the map would show the advantages which Shuster, at the head of the navigable portion of the Karun River, possessed over Bushire. There you had a port distant some 130 miles by land from the Persian port of Mohammerah, to which ocean steamers had access. Shuster commanded a series of routes to the more populous districts and cities of Persia. The chief among these were :—1. From Shuster *viâ* Khoremabad, Burujird, and Sultanabad to Teheran, a distance of 480 miles, as against 800 between Teheran and Bushire. The elevations along this road were :—For a distance of about 110 miles its profile rose from under 6000 feet to passes over 7000 feet high, the highest being that of Kushkedar, between Sultanabad and Burujird, 7490 feet high. A group of European capitalists were engaged in constructing a cart road along this section. 2. From Shuster *viâ* Malamir to Ispahan, a distance of 250 miles by the road which he had described in the current number of the Royal Geographical Society's Proceedings. The higher altitudes along this road extended for a distance of about 73 miles, and the highest pass along it was about 8650 feet high. By these two roads the distance between Teheran and a port was reduced from 800 miles *viâ* Bushire to 480 miles *viâ* Shuster, while Ispahan held the benefit of 250 as against 520 miles. The first of the two routes from Shuster traversed a country which had been subject to the depredations of the Lur tribes ; but the opening of the Karun River and the revenues derived from increased commerce would make it worth while for the Persian Government to ensure its security. As to the second it lay through the country of the friendly Bakhtiari, who were well within the authority of the Persian Government.

It was now nearly two years since the Karun River had been declared open to navigation as far as Ahwaz, at which point there was a natural dam across the stream. A continuous steam service had, after much negotiation, been organised both above and below Ahwaz. Why was commerce still loth to enter and avail itself of the new trade routes? This was an important question which those interested in commercial geography would not hesitate to ask. The commerce of Great Britain and India with Persia had been estimated recently by a careful writer at a value of 2,500,000*l*. a year. That figure alone made it seem worth while to attempt an answer. The reasons might be briefly stated thus :—1. The collection of customs was still in a state of disorder ; a settlement had been arrived at nearly a year ago between the British and the Persian Governments by which the customs were to be collected at Shuster, the port of terminus, but this important measure still remained unfulfilled. 2. A postal service on the Karun required to be organised ; this was a matter for our own Government, and its importance had been pointed out by Colonel Bell and Sir R. Murdoch Smith. These were the leading obstacles to commerce as far as Shuster ; once it had penetrated thither it would soon pass further. The development of the short track to Ispahan was well within the power of the Persian Government. The advantages which would accrue to Persia by the use of the new trade routes would be enormous. The benefits to ourselves and to European commerce would not be insignificant. In the past our interest in Persia had been spasmodic ; sometimes we had thought no expenditure too extravagant, at others we had wrapped ourselves in a cold indifference to her fate. Would the new era repeat the uneven history of the old?

*Notes on the Country lying between Lakes Nyassa, Rukwa, and Tanganyika.*
*By* W. Kerr Cross.

This paper describes the Ukonda plains at the north and west of Nyassa, the people, their villages, banana groves, gardens, customs, etc. It also deals with the hill-countries north of these plains.

*Journeys in Ashanti and Neighbouring Regions.*
By R. Austin Freeman, M.R.C.S., etc.

The paper describes a journey through a tract of country in and to the north of Upper Guinea, comprising the territories of Fánti, Assín, Ádánsi, Asháuti, Jáman, and Grúinsi. This tract forms the interior of the Gold Coast. The first four countries are inhabited by various branches of the great Otshwí family, and the remainder by certain pagan aboriginal tribes, and by numbers of Wongára or Mandingo immigrants. Journeying from Cape Coast, through Ashanti to Bontuku, the capital of Jaman, the author crossed three zones of country: (1) open country covered with low bush about 30 miles broad; (2) dense forests about 180 miles broad; (3) open park-like country which, alternating with grassy plains, seems to occupy the greater part of Central and Eastern Africa. On arrival at Kumassi, the capital of Ashanti, the author was received by the king and principal chiefs with great ceremony, the court of Kumassi retaining much of its former splendour. The town of Kumassi is much dilapidated, but presents many relics of great interest. Jaman is a kingdom situated to the N.W. of Ashanti, about 9300 square miles in extent; its capital, Bontuku, is a large town closely resembling in appearance the towns of the Tawarek and upper Niger. It is inhabited almost exclusively by Mohammedans, and forms an important slave depot, as do also the Gruinsi towns of Wà and Bóri.

The commercial resources of the tract of country here described are considerable; over the whole of it gold is fairly plentiful, and the forest abounds in rubber plants both in the form of trees and vines. Hard woods are very plentiful, and are of great value in Europe, notably the Odúm and Pappáo, both of which trees reach a height of nearly 200 feet. The Kola nut also, which grows abundantly in the forest, has a great and increasing commercial value. The country is intersected by several considerable rivers, which might be easily rendered navigable, and thus form great highways of trade. There are, moreover, no special obstacles to the construction of railways, and the district may thus be expected to form one of the great commercial centres of the future.

*On Exploration in North-Eastern Cilicia.* By J. Theodore Bent.

After showing how geography, history, and anthropology are interwoven in this district, and the study of one is necessary to the understanding of the other, an account of the Armenian fortress of Sis is given, and the reason for its importance during the Roupenian line of Armenian kings.

The country between Sis and Anazarba is then described, and an account given of the fortress-town of Anazarba and the rivers Jeihan, Sombaz, and Savroon.

Experiences amongst the nomad tribes, and their customs and mode of living are then given, including the Afshars, the Bosdans, and the Circassians, who frequent this portion of the Cilician plains during the winter months.

The country between Anazarba and Kars Bazaar is described, and this place identified with the ancient Flaviopolis.

Exploration of ruins on a spot near the Pyramus, called Bodroun, is then

described, and its identification from epigraphy with the ancient Hieropolis-Castabala.

Inscriptions which show that Artemis Perasia was worshipped here, as Strabo tells us, are referred to to show that this is the Castabala which has hitherto been placed in Cappadocia, and is also the spot which Alexander the Great visited before the battle of Issos.

Notes on Osmanieh and the pass behind it leading into Syria.

### *From Paraguay to the Pacific. Explorations of* M. Thouars.

By H. Guillaume.

M. Thouars made four expeditions in South America. In his first, made under the auspices of the Bolivian Government in 1883, following the disappearance of the Crevaux Mission, he explored the unknown regions through which flows the river Pilcomayo. The second, in 1885, under the auspices of the Argentine Government, was devoted to an overland exploration of the delta of the Pilcomayo lying in the Argentine territory. The third, in 1886, was made in a northerly direction from Rosario to Salta, reascending the Humahuaca and the Cordilleras. The fourth, under the auspices of the Bolivian Government, was made for the purpose of discovering a navigable route eastwards for the commerce and productions of Bolivia.

M. Thouars, by a series of daily observations carefully taken, has obtained the following data:—1. The map, on a large scale, of his journey from Tarija to Asuncion *viâ* the Pilcomayo. 2. A general hydrographical map of the river Pilcomayo with its numerous windings, drawn to a scale of $\frac{1}{400000}$. 3. A relief map, measuring 1 mètre 23 centimètres by 1 mètre 17 centimètres on a scale of $\frac{1}{1000000}$, containing his four journeys. The Geographical Society of Paris is now completing the publication of these maps.

### *On the Inhabitants of the Eastern Carpathian Mountains.*

By Miss Muriel Dowie.

Miss Dowie read a paper dealing with her experiences among the people who inhabit the Carpathian mountains on the Eastern, or Polish, side. She gave a brief description of the life of these people, their work, costume, and character, and included an account of her journeys, alone, on horseback there, the mountains, and the conditions under which she was obliged to live. She concluded with some remarks upon the future of Galicia and its great natural resources in the shape of petroleum wells, salt and silver mines, together with the immense industries in connection with its woods, yet to be fully developed.

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## GEOGRAPHICAL NOTES.

### EUROPE.

**Irrigation of Russian Steppes.**—An important experiment has been made in the province of the Don Cossacks by a M. Sherebzov. He collected the water from rain and the melting of the snows into two pools, holding together about 1872 million cubic feet, and distributed it among the fields in spring and summer. These pools supplied sufficient water to irrigate more than 2290 acres, but were unable to contain all the water which flowed towards them, and therefore two new

pools have been made, and the irrigated area enlarged to 2960 acres. In consequence of this irrigation the wheat crop has increased from about 9½ to 15½ bushels per acre, and the profits of the undertaking have been, according to M. Sherebzov, 30 per cent.—*Globus*, Bd. lvii., No. 24.

**Proposed Canal between Lake Onega and the White Sea.**—It has long been recognised by the Russian Government and by commercial men that a canal is needed to improve the communication between St. Petersburg and the White Sea. A technical report has now been presented to the Russian Minister of Ways and Communications (*Chamber of Commerce Journal*, Jan. 6, 1890). The canal would be 145 miles long, of which 85 miles would be natural waterway. Its breadth would be 98 feet, but at the locks would be reduced to 63 feet. The cost of the undertaking, including the construction of a port on the White Sea and the improvement of the bed of the river Svir, etc., is estimated at ten millions. The cost of transport of merchandise between St. Petersburg and Archangel is now a rouble (about 21½d.) or more per lb., whereas by the canal it would be only 40 kopecks (about 8½d.).

## ASIA.

**Trebizond.**—The following particulars concerning this *vilayet* are selected from an article in *Le Globe*, January-April, 1890. Its area is 11,238 square miles, and it contains the *sanjaks* of Trebizond, Janik, Lazistan, and Gumush-Hané. This *vilayet* is one of the most populous in the Ottoman Empire, the total number of inhabitants being 1,010,000, of whom 800,000 are Mussulmans, while the rest belong to the Greek, Armenian, and other churches. Though they are more civilised than the people of the interior, owing to their more frequent communication with Constantinople and the rest of Europe, they have preserved their patriarchal mode of life. It is by no means rare, especially in the villages, to find three generations living in the same house under the authority of the grandfather. The races which deserve particular mention are : the Lazes, said, probably erroneously, to be a mixture of Turks and Georgians ; Circassians, settled in the province in 1865, who have given a great impetus to the agriculture and commerce, and contributed greatly to the sanitary amelioration of an uncultivated and marshy country ; and the inhabitants of the nineteen Crom villages to the south of Trebizond, who claim descent from some of the Ten Thousand supposed to have remained here on the retreat of Xenophon. The climate is temperate but very damp, owing to the proximity of the sea and to the situation of the *vilayet* on the northern side of the great Pontic chain. Most of the towns on the shore are fever-haunts, while those inland are healthy. At Trebizond the seasons are very irregular. The winter is mild, the spring cold and rainy, the summer hot and stifling, and only in autumn is the sky clear and the weather agreeable. The country on the whole is very mountainous ; spurs run out northwards from the main chain, forming deep, rugged valleys. The principal rivers, in order from west to east, are the Kizil-Irmak (Halys), the Med-Irmak (Lycastus), the Yeshil-Irmak (Iris), and the Tchermé-Tchai (Thermodon).

Fishing is an important occupation in Lazistan and on the eastern coast of the *sanjak* of Trebizond. Porpoises are caught for the sake of their oil, and anchovies form a large part of the food of the lower classes, and are exported to Bulgaria. Maize is cultivated for home consumption ; nuts and walnuts, grown chiefly in Keresun, are exported to Russia and other countries of Europe, and white haricot beans to France. The cultivation of tobacco and vines is declining. Excellent fruit and vegetables are exported from Lazistan, principally to Russia ; and the oats and barley of the district of Samsun are sent to France. The *vilayet* is par-

ticularly rich in mines, containing no fewer than one hundred and twenty, from which lead, copper, manganese, coal, etc., might be extracted. But the Government not only neglects these sources of revenue, but places obstacles in the way of private individuals and companies who desire to work them. The forests cover nearly one-sixteenth of the area of the *vilayet*, and consist principally of pines, firs, oaks, beeches, poplars, and birches. The town of Trebizond has always been an emporium for the trade with Persia. Yet it was not until 1865 that the Turkish Government decided to make a road to Erzerum and the Persian frontier. This traffic yields to Trebizond a profit of about £656,000 per annum. Trebizond has no port, but only a jetty barely 1000 feet long. It contains 35,000 inhabitants, many of whom manufacture linen and silk garments for women. They are also skilful in the working of silver filigree and gold.

## AUSTRALASIA.

**New Guinea.**—In February and March of the present year Sir W. Macgregor explored the shore of this island from the mouth of the Fly River to the Dutch frontier. Passing a village called Siu, he came to Parama (Bampton Island). From this point the mainland as far as the Mai Kussa River is called Daudai, and in the other direction past Odagositia it is known to the natives as Dudi. Seven or eight miles from Parama lies Yaru (called Daru on the charts), and, to the south-east of it, Bobo (Bristom Island), the latter consisting entirely of mangrove swamp. Opposite the south-western corner of Yaru a river enters the sea, of which the native name is Oriomo, but it has sometimes been called the Tait River. For three miles from the mouth it is about 200 yards broad, and then it gradually contracts to 60 or 80 yards at a distance of 30 miles from the sea. The banks are low and marshy, and there is little soil fit for cultivation. Further along the coast lies Tureture, where dwells the most promising community in this part of the British territory. The houses are good and the people quiet and well-behaved. There is a considerable coco grove and food is plentiful. Three or four miles westward, near the village of Muatta, Sir W. Macgregor entered the Binature River, called on many maps the Katow. The steam launch was able to ascend about eight miles, to a point where the river divides into two branches. Near the Kawa Kussa River, which enters the sea between the islands of Malukawa and Sapuralkawa, stands the only hill on this part of the coast, known to the natives as Mabudauan. It is nearly 200 feet high, is formed of granite and covered by large trees, and has some fairly good land for cultivation. It is probably healthy, and would be a good site for a station. The natives along the coast suffer severely from the raids of the Tugere, a warlike and numerous tribe, who come in large canoes with the north-west wind round the coast from the west, and return when the south-east wind sets in. Seeing that it was necessary that the depredations of these pirates should be stopped, and hearing at Boigu that they came down the Mai Kussa, Sir W. Macgregor ascended that river in search of them. This so-called river is an arm of the sea, about a mile broad at the mouth, and at a distance of 28 miles from the sea it is joined by another inlet, the Wasi Kussa. From the junction a river runs nearly north, at first some 300 yards broad and 25 to 30 yards at a distance of 43 miles from the sea. Mangroves predominate along the lower courses of these rivers, and the whole country is unfruitful. For the area contained between the Mai Kussa, the Wasi Kussa, and the sea, Sir W. Macgregor retained the name of Strachan Island. Here were seen a few miserable natives of the Wasi tribe, and several unoccupied Tugere camps were noticed along the river. Passing four islands west of the Wasi Kussa, the expedition came to two bays, which were named, respectively, after Mr. B. H. Thomson, Sir W. Macgregor's private secretary, and

Captain Heath, portmaster of Queensland. The day after leaving Heath Bay natives of the Tugere tribe were at last met with. They are a very fine race of men of a light brown colour. They wear no clothes, but a profusion of ornaments, of which those in the *alw nasi* are most singular. One man wore in his nose two leg bones of a pig, three-fourths of an inch in diameter and about seven inches long; others had bamboos or claws of the cassowary. Pigs' tails and dogs' and wallabys' teeth are suspended round the neck. The hair is plaited into small cords, the ends of which are rolled into balls. Their canoes are clumsily built and are thirty-five to forty feet long. They are propelled by poles made of the midrib of the sago palm leaf. No paddles were seen. Returning eastwards, the party explored Heath Bay, and found a river 150 to 200 yards wide at the mouth and four or five fathoms deep. This they ascended to a distance of 74 miles, and on the way fell in with some natives of inferior build to the Tugere. Their canoes also were of a different form, but propelled in the same way. The river running into Heath Bay may, perhaps, be the one represented in the map to Captain Strachan's *Adventures and Explorations in New Guinea*. Its mouth is approximately in long. 141° 30′ E. and lat. 9° 15′ S. The tides along this western coast of the British territory deserve to be noticed. Spring tides have a rise and fall of a dozen feet. There is a full high tide once in twenty-four hours followed by a half low tide, then a full high tide, and a very low tide, when many miles of flats are left dry between the sea and the beach. There are a few turtle and dugong along the coast, but on the whole fishing is not a profitable occupation.

## GENERAL.

**The British Coal Question.**—At a meeting of the Royal Statistical Society on 17th June 1890, Mr. George G. Chisholm submitted a valuable and comprehensive paper on this subject. The scope of the paper is explained by the title: "An examination of the coal and iron production of the principal coal and iron producing countries of the world, with reference to the English coal question." The following is an abstract of Mr. Chisholm's paper:—

With a view to this examination a comparison is first made of the rates of increase in the amount of coal production in different countries. A table drawn up for this purpose shows that since 1860 the rate of expansion under this head has been less rapid in the United Kingdom than in several other countries, notably the United States and Germany. If the same average rates of expansion were continued indefinitely in the future for the United Kingdom, the United States, and Germany respectively, as are found by calculation to have been maintained for these countries between the mean of the three years 1879-81 and the mean of the three years 1886-88, then the coal production of the United Kingdom would be overtaken by that of the United States in 1894, by that of Germany in 1928, by the aggregate coal and lignite production of Germany in 1919. A similar examination of the rate of growth of the production of iron shows that in this industry these two countries appear to be gaining still more rapidly upon the United Kingdom. This is important as tending to bring about a diminution in the rate of increase in the demand for British coal. Hitherto the iron industry of the chief industrial countries has been greatly stimulated by the rapid extension of railways. An examination of railway statistics since 1840 shows that the new mileage required year by year all over the world has increased on the average at a pretty high geometrical rate. The examination shows also, however, that this is brought about by the construction of railways on a great scale in different parts of the world successively. Regions in which railways have long been laid show no

such rapid increase in the amount of the new mileage. This leads to the conclusion that sooner or later a time will come when the rate of increase of the railway mileage of the world will be greatly reduced. That would probably involve a pretty severe check to the growth of the demand for iron, and indirectly that of the demand for coal.

With regard to the consumption of British coal, any conclusions that may be drawn from such data as are dealt with in this paper should be stated with great diffidence ; but, so far as yet appears, we have no reason to anticipate at any time anything of the nature of a disaster or sudden catastrophe from our continued consumption of coal. The change of conditions will probably be a gradual one throughout. First we may expect only the continuation of a process already begun, a gradual contraction in the rate of expansion of the coal production. That may pass insensibly into a stationary state of coal production, to be followed by a gradual decline. Such, remarks Professor Marshall, is the actually observed history of the working of individual coal mines. It may be that the modification of the rate of increase or decrease of the amount of coal production will not always be so gradual as it is now ; still we may hope that it may be gradual enough to allow of the habits of the people being adapted to the changing conditions. Nevertheless, the fact of the steady rate of increase in the aggregate number of the population of Great Britain, taken along with apparent signs of a declining rate of expansion in some of the chief industries of the country, is one that cannot be regarded with equanimity, and makes it urgently to be desired that the true state of the case should be carefully inquired into, and made as widely known as possible. With reference to the possibility of the influences adverse to the production of British coal being somewhat suddenly and strongly reinforced in the future, an account is given from Richthofen's *China* of certain great Chinese coalfields, the connection of which by rail with the great plain of China and the great seaports could not fail, according to Richthofen, "to bring about a revolution in the commerce and intercourse of the world."

**Meteorology.**—At a meeting of the International Meteorological Congress, held in Paris last September, the Rev. Father Denza read a paper on the "Decrease of temperature in the vertical line." According to the figures he produced, the annual mean ascent required to obtain a decrease of 1° of temperature was 150 mètres in the valley of Aosta, and 191 at Moncalieri (Mont Cenis), while 192 was the mean for the whole of Italy. At Pike's Peak, Colorado, 159 mètres is the height required. In the winter months the heights in the valley of Aosta and at Moncalieri are 189 and 375 respectively, and 289 is the mean for Italy. It frequently happens that the temperature rises until a certain height is reached and then decreases. This was particularly noticeable in January 1887, when the temperature increased up to 700 metres (about 2200 feet), and then diminished according to the ordinary law. The barometric pressure was high, the air dry and calm. This phenomenon was confirmed by observations referred to by other members of the Congress, and Père Dechevrens pointed out the necessity of taking the barometric pressure into account in comparing changes of temperature in the vertical. In China, at an observatory situated on a mountain in the midst of a vast plain, a rise of 10° of temperature is always observed for a fall of 20 millimètres in barometric pressure, and at Mount Washington, when the wind blows at the rate of 100 miles an hour, the variation of the temperature is 30° for the same decrease of pressure.

M. Hildebrandsson read a long paper on the mean direction of the upper currents of the air. The general results are that in temperate zones the upper

currents move from west to east; that in the tropics the reverse obtains; and that the direction of the upper currents seems to coincide everywhere with the mean trajectory of the centres of barometric depression. Several other questions were discussed, but in most cases no definite conclusions were arrived at.—*Report of the International Meteorological Congress by Lieut. Aaron Ward, U.S.N.*

**The Salinity of the North Atlantic Ocean.**—Professor O. Krümmel has published, in *Petermann's Mitt.* Bd. 36, No. vii., a map showing the salinity of the surface water of the North Atlantic Ocean. Two such maps already exist; the one in the atlas of the "Deutsche Seewarte," appended to the *Segelhandbuch des Atlantischen Ozeans*, the other, drawn by Mr. J. Y. Buchanan, in the great *Challenger* work. In both cases the salinity is deduced from the specific gravity, Mr. Buchanan giving the specific gravity of the sea-water at 60° F., and taking distilled water at 4° C. as the standard, while in the German map 17°·5 C. is the normal temperature for both salt and distilled water. The values expressed in one of these units may be reduced to the other and the salinity obtained by formulæ given in Dr. Krümmel's paper. The two maps show considerable differences, and Dr. Krümmel gives reasons for believing that some of the data employed in the construction of both the German and the English maps are not reliable. The instruments were not true or not properly tested, the observers were inexperienced, or the temperature has not been recorded. He therefore selects the following observations of well-known scientists as a basis for the construction of his map:—(1) those of Dr. Lenz during Kotzebue's voyage, 1823 and 1826; (2) of J. Y. Buchanan on board the *Challenger*, 1873 and 1876; (3) of the officers of the *Gazelle*, 1874 and 1876; (4) of Professor J. Thoulet on board the *Clorinde*, during a voyage between Brest and Newfoundland in the summer of 1886; (5) of Hamberg, to the south of Greenland in 1885; and (6) of J. Y. Buchanan, on board the *Buccaneer*, in West African waters in the year 1886. All these, Dr. Krümmel affirms, will bear the most searching examination. He himself also, on the "Plankton Expedition," in 1889, paid especial attention to the specific gravity of the water, for which purpose he had obtained hydrometers of exceptional sensitiveness. In the laboratory the scale could easily be read to the fifth decimal, and on board ship, in good weather, to the fourth. When the sea was rough, the samples of water were reserved for testing under more favourable circumstances. As a rule samples were taken once a day, but where the salinity was subject to sudden changes, *e.g.*, in crossing from the Labrador to the Florida stream, the water was tested every hour. The results were also checked by chemical tests. On the whole Professor Krümmel's map resembles Buchanan's much more closely than that of the "Deutsche Seewarte." Buchanan represents the expanse of ocean where the water has a maximum salinity of over 37°·2 parts per thousand as an elliptical area, stretching in a west-south-westerly direction from the Canaries to a point lying in 22° N. lat., and 55° W. long.; but Dr. Krümmel considers that the limits cannot be laid down so exactly. It appears certain, however, that the maximum lies not very far from 25° N. lat. and 35° W. long., and that it never exceeds 37°·5 parts per thousand. From this point the salinity decreases in all directions. A comparison with barometrical charts shows that the region of most frequent calms lies further to the north, so that the area of maximum salinity does not coincide with that of maximum atmospheric dryness. This is due to the water of the Gulf Stream, which, after passing the Azores, turns to the south-west at 30° N. lat. and 30° W. long., and enters the Doldrums with a salinity of 36 to 36°·5 parts per thousand. As it flows further to the south and south-west, the evaporation being in excess of the rainfall, the salinity gradually attains a maximum after the region of greatest pressure is

passed. North of lat. 45° the quantity of salt does not exceed 36 per thousand, owing to more abundant rain and a lower temperature. Between Greenland and Newfoundland the lighter water poured by the Labrador Stream into the Gulf Stream causes the salinity to fall to 34·5 parts per thousand. In the Guinea Stream the limits are difficult to determine accurately. The area of about 35·5 parts appears to extend northwards in summer and contract in winter. The heavy rains of the south-west monsoon probably cause considerable local diminution in the density of the surface water, while a succession of rainless days with a fresh trade wind increases the salinity. The increase in the quantity of salt as the Brazilian coast is approached was noticed by Buchanan in 1873, and ascribed by him to the prevalence of winds blowing towards the land and the small quantity of rain which falls on that coast. Dr. Krümmel found that the water maintains this density westwards of Cape St. Roque, and that the course of the Amazon stream cannot be traced, as has been supposed, along the coast of Guiana.

## NEW BOOKS.

*The Growth of English Industry and Commerce during the Early and Middle Ages.* By W. Cunningham, D.D., Vicar of St. Mary's the Great, University Lecturer and Lecturer in Trinity College, Cambridge. Cambridge: At the University Press, 1890. Pp. xv. and 626.

For generations historians have been wont to narrate the doings of emperors and kings and princes, popes and bishops, statesmen and war captains, and parliament chiefs, the rulers of the world, the governors of men. But the time has now come when something must be recorded about the men who have been ruled, governed — oftener misgoverned. We are now persuaded that there is nothing derogatory to the dignity of history in studying the fortunes and misfortunes of the multitudinous masses of the nations—the people, strictly so called. Rightly viewed, from the vantage-ground of a more liberal reason, the study of the doings of these, the humble ones of the earth, is one of the noblest duties historians can perform. In this pathway of historical inquiry Dr. Cunningham has chosen to tread, and on this account, no less than on account of its intrinsic merits, we greet his book with the heartiest welcome.

Although it is not, strictly speaking, a new book—only the second edition of part of an earlier book published in 1882—still it must be accounted as to all intents and purposes a new book, "for it contains more than twice as much matter as the corresponding portion of the first edition . . . and the whole has been completely recast." Dr. Cunningham has certainly spared neither labour nor trouble in his efforts to make the book complete; the mere list of the authorities from whom he has drawn his facts fills more than seventeen pages. This might suggest a suspicion that the attempt to manipulate such a vast mass of materials must result in the author sinking overwhelmed under the burden of his task. Such, however, is not the case; far from it. Not only has Dr. Cunningham preserved complete mastery over his subject; he has presented the results of his investigations in a most admirable and careful manner. His style, though not brilliant, is remarkable for clearness and logical strength, and its judicious and temperate spirit. There is nothing, or next to nothing, that could justly be stig-

matised as either pedantry or misplaced erudition, in spite of the fact that the foot of nearly every page is more or less deeply braided with notes. The book is full of new and valuable information. A bare catalogue of the more important changes, movements, and developments discussed will give the reader at least some idea of the great and varied interest it offers:—the early forms of tillage and social organisation amongst the primitive English; the influence exercised by Romans and Danes respectively upon the economic conditions of England; the changes caused by the introduction of the feudal system by the Conqueror; the beginnings of industry; the dawn of commerce, and the peculiar nature of early commercial transactions; the growth of the wool trade with the cities of Flanders and Italy, and the wine trade with Gascony; the relations and rivalries between the English merchants and those of the Hanseatic League; the early stages of the mercantile system; the dark days of the fourteenth century; and the effects of the stirring events that marked the reigns of the Tudor kings and queens. All these and many other topics are treated in a most interesting manner.

There are, however, two features which, though not particularly obtrusive, are in our judgment misplaced, or at least out of harmony with the rest of the work. There is a tendency in certain chapters to introduce discussions upon the doctrinal principles of the science of political economy, especially in the second and third chapters of the Introductory Essay and in Section B of Chapter VI. Space is also taken up with some paragraphs treating of the relative value of different sources and different classes or kinds of authorities (cf. pp. 22, 229). These passages are scarcely in keeping with the concrete treatment of the work. If the book and its continuation (now in the press) are made, as they certainly ought to be made, text-books for all students of English history, it might perhaps be found advisable to relegate to the preface the passages to which we allude—if they cannot rather be omitted altogether.

We now proceed to offer a few suggestions, not in any captious spirit, but in the hope that they may prove useful to Dr. Cunningham. An illustration of the characteristic features of nomadic economy is, he will find, afforded by the *nomad* Lapps of Norwegian Nordland (cf. Tromholt, and Du Chaillu, *Land of the Midnight Sun*). Whilst agreeing with Dr. Cunningham in discrediting "the continued existence of a numerous and generally diffused servile population of rural labourers" after the Conquest, we would ask him whether he has not overlooked the large share which must have been taken by women as field-labourers and workers on the soil. In Norway at the present day the long, narrow, mountain-fenced valleys present conditions in many respects analogous to the self-sufficing village communities of early English times; and in those valleys women do a great part of the agricultural work (as indeed they do in some parts of Scotland), and only a comparatively small proportion of the soil in such valleys is actually under cultivation, a condition of things to which there exists an exact parallel in the mountain valleys of Kafiristan, north-west of the Punjab, to say nothing of many African (Negro) communities. The early Norse traders had two principal trade routes with southern Europe and the Levant, one down the Vistula, the other down the Rhine valley; but amber and the precious metals were hardly the most important, or the only important, articles of commerce along these routes (cf. Du Chaillu, *Viking Age*, and more especially Montelius). Dr. Cunningham points out that the Jews have not been altogether blameless themselves in the terrible persecutions to which they have been subjected by Christian nations in past ages; and he is right, as anybody is aware who knows the spirit of Pharisaical pride, narrow intolerance and self-satisfied ignorance that were only too often engendered by the Rabbinical code. Yet, if they had followed even that code more

faithfully, they would not have made themselves so obnoxious to the people amongst whom they lived, and whom they frequently looked down upon with insufferable pride and contempt. For the Talmud strictly enjoins them to learn manual trades, and cites with commendation instances of great scholars who have in times past laboured with their own hands daily (this has a bearing upon pp. 191, *n.* 2, and 265). It should be made quite plain that the "Prussia" spoken of on pp. 281, 371, 374 means the territory conquered by the Teutonic Knights, afterwards the duchy of East and West Prussia, not in any way conterminous with the existing kingdom of Prussia; also that the "Prussian subjects" (p. 377) were men who owed allegiance, not to any prince of Prussia, but to the Teutonic order. They can hardly have been Prussians—the heathen Litho-Slavic race—at all, for they had, at the period mentioned, only just been subjugated by the German knights after half a century of obstinate fighting. Those "subjects" were in all probability *Germans* and immigrants. On p. 449 a transposition of epithets has taken place; we ought to read "Muscovite Company" (correct on p. 464, but incorrect on p. 84) and "Great Duke of Russia," or more correctly "Czar of Russia," a title assumed by Ivan the Terrible in 1547. The agrarian circumstances of the Mecklenburg duchies previous to 1848 would, we believe, furnish very useful parallels for comparison with the agrarian condition of England in the fifteenth century and earlier. Some hint should have been given on p. 420 that the "travels" of Sir John Mandeville are now held not to be genuine, although, of course, the fact does not invalidate the purpose for which Dr. Cunningham cites the book. Where did the "African gold" mentioned on p. 422 come from? If there is any clew to the precise locality, it would be interesting to know where it was. It might perhaps throw light on the old gold mines that were worked in some distant period of the past by a people not known in Mashonaland. We should have liked to say something about the commercial morality of mediæval times as compared with the moral principles tacitly acted upon in the commercial world of the present day, as also with those laid down by the Chinese sage Mencius 300 years before Christ; but, having already overstepped our limits, we must forbear.

The value of the book is greatly enhanced by appendices on the Assize of Bread, Manorial Records, Municipal Life, Wool Trade in the thirteenth and fourteenth centuries, and Nicholas Oresme's *Tractatus de Origine Monetarum*—a summary of the substance of this last would have been more useful than the text—and an excellent index, which, however, could be still further improved by a few additions, such as to Boston, p. 172, n. 6, p. 280, note to previous page; Norwich, p. 451; the noble (coin), p. 327; and others which we will not record. The punctuation, too, would be improved by another careful reading. We have noticed more than one short sentence in which subject and predicate are separated by a comma. "There" is printed "tthere" on p. 451, l. 18, and "Stanford" (p. 185 l. 4 from bottom) should be "Stamford."

*A Sketch of the History of Fife and Kinross. A Study in Scottish History and Character.* By Æ. J. G. Mackay, Sheriff of those Counties. Edinburgh and London: Blackwood, 1890.

This book is, as it professes to be, more a history of politics and society in Fife than a topographical work. Its sketches of the story of the Reformation, so far as enacted in Fife, with the central figures of Mary and Knox, are bright and interesting. The rapid survey of the facts and theories bearing on the Christian settlement of the "Kingdom"; the pretty picture of the performance of Lyndsay's

rude drama at Cupar in 1535; the chapter on the revolutionary period of the Covenant; the marvellously sympathetic notice of that cantankerous movement, the secession; the amusing reproduction of the impressions of Defoe, Pococke, and Samuel Johnson in their several peregrinations through Fife; the just and learned catalogue of the great men of the county, in every sphere and walk of life; the careful collection of what is known about the development of industry and social organisation: all these make Sheriff Mackay's book very pleasant and instructive reading. They also show in the author a very wide range of antiquarian and historical knowledge, not dissociated (as is too often the case) from a warm sympathy with art and a still warmer sympathy with humanity in "all ranks and conditions of men." Fife has great reason to thank her Sheriff and be proud of him. Surely never before did a Scottish sheriff offer so graceful a tribute to his jurisdiction. A Highlander by descent and an Episcopalian in religion, the Sheriff seems almost to have succeeded for the purposes of this book in converting himself into a Presbyterian Fifer. He quotes their humorous proverbs with manifest gusto, and describes their mental and moral peculiarities with a loving hand. He tells us not only of lairds and ladies, but of the poor weaving woman with her "waulking-song," and the poor "scrappy" with his solitary cow upon the Lomond. He seems to think the Fife character the finest possible cross of Celt and Saxon. Of special interest to geographers are his references to the cartographer Timothy Pont, who was born in the parish of Culross, and to the survey of Fife in 1800 by Dr. James Thomson, of Markinch. One would have liked to hear a little more about the music, and also the language, of Fife, especially in connection with its place-names. From the philological point of view, Fife does not seem to be so isolated and independent as in other matters. According to Mr. Ellis, in his great work on English pronunciation, it belongs to District 34, which includes the Lothians, Peebles, Berwick, and part of Stirling. We think, too, that in describing the shores of Fife, Sheriff Mackay should have referred to Sam Bough's immortal pictures of Anstruther Harbour, Pittenweem, and St. Monans; and the paragraphs about Fife in Hector Boece and Bishop Leslie are quaint enough to entitle them to some notice. But this book is too good for criticism. May other counties have the same good fortune as Fife!

*Lord Clive.* By Colonel Sir Charles Wilson. "English Men of Action Series." London: Macmillan and Co., 1890. Pp. xvi. and 221. *Price* 2*s.* 6*d.*

It must have been no easy task to arrange the varied and stirring events in the career of Lord Clive within the narrow compass of these pages, giving to each its due position and prominence, and, at the same time, adding the information necessary to illustrate the reasons for and the results of these actions. Not only has Sir Charles Wilson managed all this in a narrative of sustained interest and perfect clearness, but he has prefixed to it a considerable amount of matter relative to the state of affairs in India at a time when, in spite of the most wonderful blundering and under a bad system of management, amid plotting and fighting and making a mess of things generally, our empire there first took shape, finally triumphing over the splendid resolution and diplomacy of Dupleix and the dash and courage of Paradis. The history of our ultimate success under Clive has often been told, but never, we think, in such a short narrative, nor to better purpose than in the pages now under review. Rare judgment has guided the author throughout the whole of his modest work, resulting in a justness of balance and completeness and clearness of detail that is seldom

met with in volumes of a much more ambitious nature. A portrait of Clive forms the frontispiece; and a map of India is given, sufficiently clear and likely to serve all purposes of reference in connection with the text. But there is no index. The general get-up of the volume is good, corresponding to that of the other numbers of the series.

*Frays and Forays. Sketches in Peace and War.* By Captain G. J. Younghusband, Queen's Own Corps of Guides. London: Percival and Co., 1890. Pp. 152. *Price* 1*s.*

These slight sketches, representing the Indian soldier under various aspects and in diverse situations, are well written, and afford interesting information on the important subject of the defence of our Indian Empire. Much of the matter discussed will be new to many; and the little book ought to meet with a hearty reception from all who concern themselves with our affairs in the East. We have read the sketches with interest and pleasure, noting with satisfaction that Captain Younghusband's more extended experience as an author has subdued to some extent his former somewhat exuberant style.

*A Social Departure. How Orthodocia and I went Round the World by Ourselves.* By Sara Jeanette Duncan. With 111 Illustrations. London: Chatto and Windus, 1890. Pp. xii. + 417.

This narrative differs widely from the lady's book of impressions of foreign travel, to which we have become so accustomed of late years. Miss Duncan and her friend, an English girl of pronounced insular opinions on many points—officers of the American Customs in particular—made an extended trip across America, to Japan, India, and Egypt, without male escort, meeting, as might be expected, with experiences and receiving impressions of a freshness unknown to the more jealously guarded lady travellers of conventional life.

The descriptions of Japan and the Japs are among the best things in the book, and we have seen no better popular account of that country and people. But Miss Duncan may be congratulated on her whole work, every page of which we have perused with pleasure and interest. The illustrations are not so distinct as they might be, but are spirited and numerous.

*History of the Dominion of Canada.* By the Rev. William Parr Greswell, M.A. (Oxon.), F.R.C.I. Under the Auspices of the Royal Colonial Institute. Oxford: At the Clarendon Press, 1890. Pp. xxxi. + 339. *Price* 7*s.* 6*d.*

This new volume of the Clarendon Press series is chiefly intended for use in the higher classes of public schools, and for such it appears to be, in every way, well adapted. At the same time, older readers will be glad to have a clear and somewhat detailed history of the Dominion in the handsome and handy form in which it is here presented. There is much freshness in Mr. Greswell's style. Even the account of the siege and capture of Quebec and other incidents, so frequently related as to have become wellnigh hackneyed, are, in his hands, made to sustain the reader's interest to the full. The chapter treating of the methods and results of British colonisation is well timed, coming, as it does, when all eyes are turned towards our African possessions, and Imperial Federation is exciting so much attention. The volume is embellished by an abundance of maps and plans, and there is an excellent index.

# THE SCOTTISH GEOGRAPHICAL MAGAZINE.

## THE PARTITION OF AFRICA.

By Arthur Silva White. F.R.S.E.,

*Secretary to the Royal Scottish Geographical Society.*

(*With a Map.*)

In the early part of 1888 I published in the Society's Magazine a paper on the above subject, which was illustrated with a map showing European possessions and claims in Central and Southern Africa. At that time public attention was not directed to Africa in the same degree as it is now, nor were *data* for the discussion of territorial claims so easily obtainable. The paper, however, served the purpose for which it was written; and I take the earliest opportunity of redeeming the promise therein made: to give, as soon as it was possible, a more complete account of the partition of Africa among the European Powers. In order to accomplish this it will be essential to travel over the same ground to a certain extent, though it will not be necessary to enter into very great detail. The new political map of Africa which Mr. J. G. Bartholomew has designed to illustrate my paper may be trusted for giving the precise boundaries, so far as these have been delimitated or provisionally fixed. We may rest satisfied in this place with a bald narrative of how these boundary-lines came to be drawn on the map of Africa. The subject has been discussed by me in a volume on *The Development of Africa*, which is on the eve of publication; and I am indebted to my publishers—Messrs. George Philip and Son—for their permission to adapt and abridge the chapter in question for my present purpose.

It is absolutely essential to distinguish between acquisitions by treaty [1] and acquisitions by paint-brush.[2]

The partition of Africa may be said to date from the Berlin Conference of 1884-85. Prior to that Conference the question of inland boundaries was scarcely considered: the necessity for such had hardly arisen. But the frontiers between the possessions of European Powers on the coasts had in a majority of cases been defined with some degree of certainty.[3]

Outstanding disputes were settled at or shortly after the Conference. Only two instances need be given. Portugal received some recognition of her historical pretensions south of the Lower Congo, and also obtained the *enclave* of Kabinda, to the north. To France was awarded an important accession of territory on the Lower Congo. The basins of the Niger and Congo were declared free to the flags of all nations. And, finally, the International Association, founded by the King of the Belgians, was, under its new title, recognised by the civilised world as a sovereign State, and took possession of the conventional basin of the Congo.

The boundaries of the Congo Independent State are shown on our map. They were roughly defined at the Berlin Conference, but their more accurate delimitation was adjusted by separate treaties concluded with contiguous States. Some uncertainty still exists as to the precise boundaries at certain points, but, when the occasion demands, these uncertainties can easily be cleared up. The title-deeds of the State are clearly and, I believe, accurately given in M. Banning's *Partage Politique de l'Afrique* (pp. 89-152).

Two months after the Conference had concluded its labours, Great Britain and Germany had a serious dispute in regard to their respective spheres of influence on the Gulf of Guinea.

The basin of the Lower Niger had long been under the exclusive influence of Great Britain, who possessed also colonies to the west of it. In the Cameroons region British missionaries had for forty years laboured in a promising field, and, incidentally, had sown the seed of British sovereignty. But Germany also shared the ambition of occupying a country which her subjects had assisted in discovering and opening up. Her merchants were said to enjoy the monopoly of trade on the Cameroons

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[1] My *data* have been derived chiefly from the following sources:— *Le Partage Politique de l'Afrique* (June 1888), by Emile Banning, which gives in a convenient form the texts of the treaties and other international transactions and agreements between the years 1885 and 1888; from the two articles which, previous to the publication of M. Banning's book, were contributed by me to the *Scottish Geographical Magazine* (vol. iv., 1888, pp. 152 and 298) on "The Partition of Central Africa," and "The East-Central African Question"; and from British and foreign official sources. Treaties vary also in their international significance. A distinction is to be observed between treaties binding the contracting parties alone and treaties binding non-contracting parties whose concurrence has been obtained.

[2] "Acquisition by paint-brush" simply indicates the ambition of territorial extension, and, like the "confidence trick," was only practised by desperate characters.

[3] Cf. map illustrating Mr. Stanley's Inaugural Address, *Scottish Geographical Magazine*, vol. i., p. 1, *et seq.*

River. The Imperial German Government, therefore, decided to take possession of the country, and to establish a naval station on the Coast.

Dr. Nachtigal was despatched with instructions (dated 19th May 1884) to conclude treaties with the native chiefs between the Niger and Gabún, and in the district of Angra Pequeña. Britain, with similar objects in view, also issued instructions (16th May 1884) to Admiral Hewett. But Dr. Nachtigal was the first to arrive on the scene of action. The German flag was hoisted (5th July) at Togo and (14th July) at Cameroons. Admiral Hewett arrived on 19th July, in time to register his protest.

On 13th October 1884, Prince Bismarck notified to the Powers the *fait accompli* of a German Protectorate, not only in the Cameroons but also at Togo (Slave Coast) and in South-West Africa, between the Orange River and Cape Frio,—Walvisch Bay excepted. The British Cabinet, however, endeavoured to retrieve its position. On 19th July Admiral Hewett placed the Mission Station at Victoria under British protection, and concluded treaties (July to September) with the native chiefs on the Littoral between Victoria and Old Calabar.

Diplomatic documents were freely exchanged between London and Berlin during the next few months. The most important were Lord Granville's despatch (29th April 1885) to Count Münster, the German Ambassador at the Court of St. James's, and the reply (7th May) of the latter. These despatches laid the basis of an accord between the two Powers, and were supplemented by the Declarations of 16th May and 2d June. The compromise thus arrived at placed the Mission Station of Victoria within the German sphere of influence in consideration of an indemnity (£4000) to be paid to the English Baptists by the Basel Missions.

But the frontier between the two spheres of influence on the Bight of Biafra remained undefined. Despatches were exchanged between Lord Rosebery (27th July 1886), on the part of the British Government, and Count Hatzfeldt (2d August), on behalf of the German Government, which resulted in a line being drawn from the Coast to Yola, on the Benué.

On the 10th July 1886, the National African Company received a royal charter under its new title of the Royal Niger Company, and was given administrative powers over the territories covered by its treaties. The regions thereby placed under British protection are defined on our map. Apart from the Oil Rivers District, which is directly administered by the Crown, they embrace the coastal lands between Lagos and the northern frontier of German Cameroons, the Lower Niger (including the territories of Sokoto and Gandu), and the Benué from Yola to its confluence.

Germany, having settled the northern boundary of her Cameroons colony, was in the meantime negotiating its southern frontier with the French Congo. Dr. Nachtigal's treaties extended almost to the Equator and overlapped French claims. Prince Bismarck, however, in his despatch of 13th September 1884, showed himself accommodating to French susceptibilities, and was met in an equally diplomatic spirit by Baron de Courcel (despatch of 29th September). All danger of friction being

thereby removed, France and Germany eventually signed the Protocol of 24th December 1885, which defined their respective spheres of influence and action on the Bight of Biafra, and also on the Slave Coast and in Senegambia. This Convention between Germany and France fixed the inland extension of the German sphere of influence (Cameroons) at 15° E. longitude, Greenwich. It is important to remember this, because at present it allows the French Congo Territories to expand along the western bank of the M'bangi,[1] which is their conterminous boundary with the Congo Independent State, and gives access to the Sûdan.

France at about the same time was engaged in adjusting certain territorial difficulties with Portugal. A Mixed Commission, having assembled at Paris, held sixteen sittings between 22d October 1885 and 12th May 1886. The deliberations of the Commission resulted in the Franco-Portuguese Convention of 12th May 1886. France thereby secured the exclusive control of both banks of the Casamanza (in Senegambia), and the Portuguese frontier in the south was advanced approximately to the southern limit of the basin of the Casini. On the Congo, Portugal retained the Massabi district, to which France had laid claim, but both banks of the Loango were left to France.

An attempt at mutual accommodation was made in regard to certain schemes of aggrandisement which, at the same time, were interesting to third parties. Portugal recognised a French Protectorate over Futa Jallon,[2] thus consenting to her own possessions in Upper Guinea being surrounded, and admitting France dangerously near to the British "Hinterland" behind Sierra Leone. In return, France was prevailed upon to make a qualified admission of the right of Portugal to exercise her "sovereign influence and civilisation" in the countries separating the provinces of Angóla and Mozambique. Such a concession, however, incidentally affected the interests of Great Britain and the Congo Independent State. But the Lisbon Cabinet was not discouraged. In a Note of 12th December 1885, Portugal defined the extent of the Trans-Continental empire to which she laid claim. A more flagrant instance of "annexation by paint-brush" never occurred, even in Africa. France, however, proved herself equal to the occasion, and at the same time displayed her humour of the situation: she accepted the limits as defined, "*à titre d'information*," but attached a rider reserving the rights of third parties. Portugal, unabashed by this reservation on the part of France, which she was unable to overcome, next proceeded to negotiate with Germany, with results that will be subsequently mentioned. The negotiations, having the same object, with her historic ally, Great Britain, were of an even more animated and interesting character. They were provisionally concluded only in August last,—so that we may be permitted to refer to them in another place.

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[1] Provided no other tributary of the M'bangi-Congo is found to the west, in which case, according to the Berlin Treaty of 1884-85, the conventional basin of the Congo would gain an extension.

[2] By virtue of treaties concluded in 1881 between the French Government and the Almamy.

While map-makers were busy keeping pace with political changes on the West Coast of Africa, their attention was equally demanded by events on the East Coast. Germany, having entered upon a colonial career, and being fired with the ambition of founding an African empire, gave every encouragement and support to her pioneers. The continent of Africa, being a promising and open field, was simultaneously attacked at three points.

In September 1884 there landed at Zanzibar three German travellers whose names will long be remembered by their countrymen. They were Dr. Peters, Dr. Jühlke, and Count Pfeil. Being discreet and resolute men, and the pioneers of a colonisation company, they kept their own counsel; and, before any one was made aware of their intentions, treaties had been concluded with the chiefs of Useguha, Ukami, Nguru, and Usagara, by which those territories were "acquired" by the Society for German Colonisation.

Incidentally it may be mentioned that, prior to 1884, the continental lands facing Zanzibar were almost exclusively under British influence.[1] The principal traders were British subjects, and the Sultan's government was administered under the advice of the British Resident. The entire region between the Coast and the Lakes was regarded as being under the nominal suzerainty of the Sultan: the various chiefs acknowledged his claims to a certain extent, and his aid was invariably invoked if any European travellers fell into trouble. Still, Great Britain had no territorial claims on the dominions of the Sultan. Though her influence was felt far and wide, it had been exercised solely in the cause of law and order, and with no ulterior object whatever.

Dr. Peters, then, armed with his treaties, returned to Berlin in February 1885. On the 27th February, the day following the signature of the General Act of the Berlin Conference, an Imperial *Schutzbrief*, or Charter of Protection, secured to the Society for German Colonisation the territories which had been acquired for them through Dr. Peters' treaties: in other words, a German Protectorate was proclaimed.

When it became known that Germany had seized upon the Zanzibar mainland, the indignation in colonial circles was very great. The British Foreign Office championed the cause of the Sultan, and his Highness himself made a formal protest. At the same time a German fleet was promptly despatched to Zanzibar, in order, as a German periodical explained, "to show clearly the meaning of an Imperial *Schutzbrief*." It was the first *Schutzbrief* that had been issued; consequently, it was reasonable to infer that its meaning was not clearly comprehended. Meanwhile Sir John Kirk received instructions to fall in with the views of his German colleague at Zanzibar, "where the interests of the two countries were identical."

Abandoned by his former protector, and threatened by a hostile fleet, the Sultan of Zanzibar submitted to his fate. He recognised (14th August 1885) the German Protectorate over the four inland provinces and over Vitu.

[1] In spite of the Anglo-French Convention of 10th March 1862, regarding the nominal independence of Zanzibar.

Thereupon a Delimitation Commission was appointed to apportion the disputed lands. But it was not until the end of October 1886 that the British and German Governments were in a position to exchange Identic Notes. This exchange of Identic Notes, commonly designated as the Anglo-German Convention of 1886, had the following for its main provisions:—(1) The sovereignty of the Sultan of Zanzibar was recognised over the islands of Zanzibar, Pemba, Lamu, and Mafia; as also, on the mainland, (*a*) over an uninterrupted coastal zone, ten nautical miles in breadth, between—roughly—Tunghi Bay and Kipini, and (*b*) over the stations of Kismayu, Barawa, Merka, Mukdisho, and Warsheikh, each with a small land-circuit. (2) The countries within which the provisions of the Treaty were regarded as applicable were defined as being situated between the Tana and Rovuma rivers; and the frontier between the British and German spheres of influence was drawn, as shown on our map, from the Wanga or Umbe River to the Victoria Nyanza. (3) Great Britain entered into an engagement to make no territorial acquisitions, to accept no Protectorates, and not to compete with the spread of German influence to the south of the said line, whilst Germany undertook to observe a similar abstinence in the territories to the north of the said line. (4) Both Powers recognised as belonging to Vitu the coast stretching from the north of Kipini to the north end of Manda Bay. And (5) Germany became a party to the Protocol signed by Britain and France (10th March 1862) recognising the independence of Zanzibar.

It is to be observed that in this Agreement no internal boundaries were fixed, nor was the extension of the Anglo-German frontier and the German-Portuguese frontier, in the same or in any direction, even alluded to. By separate arrangements with the Sultan of Zanzibar, Germany secured (20th December 1885) the lease for a period of fifty years of the customs in the coastal zone belonging to the Sultan within the German sphere of influence, whilst Britain obtained (30th April 1886) a similar concession in her zone.

On 8th December 1886 the Sultan gave in his adhesion to the General Act of the Berlin Conference, reserving to himself the principle of commercial liberty. The same day France recognised the Anglo-German Convention.

After receiving the *Schutzbrief*, the Society for German Colonisation transferred (April 1887) their rights to the newly-founded German East Africa Association, at whose head stood Dr. Peters. Expedition after expedition was despatched by the Association to make fresh acquisitions of territory. Relations were also opened up with some of the Somál tribes; and Dr. Peters himself headed a large expedition into East Africa. In view of these active operations, German map-makers coloured as German the entire *Hinterland* between the Coast and the confines of the Congo Independent State.

Much the same precipitate haste characterised the conduct of German agents in taking over the administration of their actual sphere of influence: they wished at once to transform the ancient home of Arabs and Negroes into a German colony. Their high-handed action in this respect led to the inevitable result of a general rising. Massacres and

retaliations ensued. The Arab chiefs on the Coast, who resented the action of their suzerain, the Sultan of Zanzibar, in transferring their allegiance to Germany, took up arms against their common enemy. In a few months not a German was left in the mainland districts; all had fled to Zanzibar. Affairs having reached this crisis, the Imperial German Government interfered. Gunboats were despatched; and a special Commissioner, Lieutenant (now Major) Wissmann, set out at the head of a small military force. The rebels were driven from their positions, and the coast towns were re-occupied. After months of desultory fighting, something like law and order was finally introduced.

Although British East Africa lay in the path of the wave of unrest that swept along the Coast, its calm was unbroken by the sound of hostile elements. The British East Africa Company, having taken over the concessions granted by the Sultan of Zanzibar to Sir William Mackinnon, assumed the administration of the territories with the good-will of the natives. The Company was not formally incorporated until 18th April 1888, and on the 3d of September it received a royal charter. One of its first public acts was to liberate a large number of slaves at a considerable cost. Caravans were despatched into the Interior, and the machinery of local administration was promptly and unostentatiously erected. Being a record of successful effort, we have little to say of the founding of British East Africa.

In order to preserve as far as possible the chronology of events, we must now refer to the progress of German colonial enterprise in South-West Africa.

Undeterred by the fact that the natural and widely known desire of Cape Colony was to expand northwards to the Zambezi, and that since 1878 Walvisch Bay had with that object been occupied as a British naval station, an enterprising Bremen merchant, Herr Lüderitz, and subsequently the German Consul-General, Dr. Nachtigal, concluded a series of political and commercial treaties with native chiefs, whereby a claim was instituted over Angra Pequeña, and over vast districts in the Interior between the Orange River and Cape Frio. On 7th August 1884 the German flag was hoisted at Angra Pequeña; and on the 13th October 1884 Germany formally notified to the Powers her protectorate over South-West Africa. A mixed Commission met at the Cape (14th March to 4th September 1885) to adjust rival claims. Its duty was not to define territorial limits; but her Majesty's Government permitted it to be understood that the British Protectorate over Bechuana-land extended in the north to 22° S. latitude, and in the west to 20° E. longitude.

The chief inland boundaries being thereby defined, Germany had no further room for expansion except on the coast between Cape Frio and the mouth of the Kuné : and this tract of country she promptly annexed. On 3d August 1885 the German Colonial Company for South-West Africa was founded, and, after the lapse of ten days, received the Imperial sanction for its incorporation. But in August 1866 a new Association was formed—the German West Africa Company—and the administration of its territories was placed under an Imperial Commissioner.

By extending her coast-line in South-West Africa from Cape Frio to

the Kunéné, Germany encroached upon Portuguese claims. On the East and West Coasts of Africa Germany had become a neighbour of Portugal; so that a precise delimitation of their frontiers was in any case necessary. Portugal claimed Cape Frio as the southern limit of her province of Angóla, whilst Germany advanced her claims up to the banks of the Kunéné in order to incorporate the whole of Ovampo-land, over which she had secured certain rights. The dispute between the two Powers dragged on for six months.

In the meantime, the Franco-Portuguese Commission was sitting at Paris. On the 27th July 1886, Baron Schmidthals proposed as the Portuguese frontier the river Kunéné, with an extension eastwards to the Zambezi, on the parallel of Humbe.[1] Then it was that Portugal endeavoured to extract from Germany, what she had partially succeeded in obtaining from France, a recognition of her claims to a Trans-Continental empire. Germany, however, was not prepared to go to the length required of her. She simply declared that the river Rovuma formed the southern boundary of her East African Possessions. Portugal then consented to the Kunéné serving as the southern boundary of her Angóla province, and adopted the latitudinal line previously laid down to the Kubango; its extension eastwards was traced by the course of the latter river up to the neighbourhood of Andara, whence it was projected to, and in the same latitude as, Katima.[2] Portugal also approved of the river Rovuma, up to the confluence of the M'sinje, forming the German-Portuguese frontier in East Africa, and went so far as to obligingly prolong this boundary-line westwards, on the same latitude, across the Nyassa to the "confines of Angóla." But realising the danger of being thus entrapped, Germany modestly accepted Lake Nyassa as the western limit of the conterminous frontier, thereby gaining from Portugal a slight extension of boundary that was not recognised by the Anglo-German Agreement of 1886. On the basis of this mutual understanding, Germany and Portugal affixed their seals to the Convention signed at Lisbon on 30th December 1886.

Thus we have seen that both Germany and France refused to recognise Portuguese claims to a Trans-Continental empire irrespective of the rights of third parties. The third party in this matter was Great Britain, to whose case we may now refer.

The intrusion of Germany into South-West Africa acted as a check upon, no less than a spur to, the extension of British influence northwards to the Zambezi. Another obstacle to this extension arose from the Boer insurrection. The treaty of 3d August 1881 gave autonomy to the Transvaal, under British sovereignty; but these bonds were slackened by the treaty of 27th February 1884. The Transvaal, with increased independence, then adopted the proud title of South African Republic; although, in regard to its foreign relations—the Orange Free State excepted—and dealings with native tribes, the Republic undertook to submit any treaties or engagements for the approbation of Her Majesty's

[1] Near which, on the Kunéné, rapids occur.

[2] On the Zambezi, where there are rapids.

Government. Zulu-land, having lost its independence, was partitioned: a third of its territories, over which a republic had been proclaimed, was absorbed (October 1887) by the Transvaal; the remainder was added (14th May 1887) to the British Possessions. Amatonga-land was in 1888 also taken under British protection.[1]

By a Convention with the South African Republic, Britain acquired in 1884 the Crown colony of Bechuana-land; and in the early part of 1885 a British Protectorate was proclaimed over the remaining portion of Bechuana-land—the western and provisional northern limits of which have already been defined by us. Sir Charles Warren, after subduing the infant Republics of Stella and Goshen, and placing the country up to the river Molopo under British sovereignty, had established a provisional protectorate over Khama's country. At that time, by an agreement between Britain and Germany (January 1885), it was understood that the 20th degree of east longitude should mark the Anglo-German frontier; but this boundary extended north only to the 22d degree of south latitude. To the south of this latitudinal boundary lay the British Protectorate; to the north of it all was unsettled. The South African Republic, with the intention of stealing a march upon Great Britain, despatched a mission to Lobengula, king of Matabele-land, etc., but its object was frustrated by the prompt action of Mr. Moffat, who, acting under instructions from the Home Government, concluded a treaty of amity between Britain and Lobengula. Similar treaties having been made with Khama, chief of the Bamangwato, and Moremi, a chief of N'gami-land, a British Protectorate was instituted over the country bounded by the Zambezi in the north, the British Possessions in the south, "the Portuguese province of Sofala" in the east, and the 20th degree of east longitude in the west. It was at this juncture that Mr. Cecil Rhodes came forward, and, having obtained certain concessions from Lobengula, founded the British South Africa Company.

For some time both before and after the declaration of a British Protectorate south of the Zambezi, Portugal endeavoured to substantiate through every means in her power the shadowy claims she possessed over Mashuna-land, to portions of the Zambezi basin, to Nyassa-land and the Shiré Highlands. Into the validity of these claims we need not enter at any length; it is necessary only to record the fact that they have been disallowed by competent authorities. In no case were they based upon occupation; and Her Majesty's Government protested[2] against any claims in no degree founded on occupation, and stated that they could not recognise the sovereignty of Portugal in territories where she was represented by no authority capable of exercising the ordinary rights of sovereignty. In similar terms the protest was renewed[3] by Lord Salisbury on 21st November 1889. His Lordship at the same time recalled the agreement between Great Britain and Lobengula (11th February 1888), which recorded the fact that Lobengula was the ruler of Mashuna-land and Makalaka-land.

[1] Treaty with Zambili, similar in kind to that with Lobengula.

[2] Memorandum from Lord Salisbury to Senhor Barros Gomes, 13th August 1887.

[3] Despatch from Lord Salisbury addressed to the British Minister at Lisbon.

On the 29th October 1889 the British South Africa Company was granted a royal charter. It was declared in this charter that "the principal field of the operations of the British South Africa Company shall be the region of South Africa,[1] lying immediately to the north of British Bechuana-land, and to the north and west of the South African Republic, and to the west of the Portuguese dominions." It will be observed that no northern limit was given, and the other boundaries were only vaguely defined; but they were sufficient to serve the purpose in view.

The position of Swazi-land was definitely settled, after a great deal of public discussion, by the arrangement between Great Britain and the South African Republic, which was accepted by the Volksraad on the 8th August 1890. This Convention provides for the continued independence of Swazi-land,[2] and a joint-control over the white settlers. The Republic is to be permitted to realise its long-cherished desire of building a railway of its own through Swazi-land to the sea (at or near Kosi Bay), provided that, within a period of six months from the date of the Convention, it enters into the existing customs' union with Cape Colony, the Orange Free State, and Bechuana-land.

Mention has been made of the further claim of Portugal to Nyassa-land and the Shiré Highlands, countries that for over thirty years have been the exclusive sphere of British missionary and commercial enterprise. In a paper published by me in the *Scottish Geographical Magazine* (vol. iv. p. 298) I discussed at some length the question at issue between Great Britain and Portugal. As the problem has now received a more or less definite solution, it seems unnecessary here to revert to it. The discussion of claims on either side dragged on for several years, and was varied by local disturbances and other unpleasant incidents. The British Foreign Office was at first indisposed to back British claims with any material support; but the storm of indignation thereby raised in Scotland, and subsequently in England, induced—if I may permit myself that expression—the Foreign Secretary to reconsider the case. Nothing, however, could have been more loyal, more statesmanlike, than the manner in which Lord Salisbury subsequently championed the cause of British enterprise in general and of the Scottish missions and trading companies in particular. The result, it may be remembered, was that a British Protectorate was proclaimed over Nyassa-land and the Shiré Highlands in 1889-90.[3]

The course of events in these parts of Africa have so far engaged our attention that we have omitted to mention several important engagements made between the European Powers and native chiefs in other parts of the continent.

On 5th July 1882, Italy took formal possession of the bay and territory of Assab. The Italian coast-line on the Red Sea now extends from

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[1] The "District of Tati" excepted.

[2] As recognised by the Convention of 1884.

[3] Consul Johnston's Protectorate Treaties, and most of the others, were concluded between August and January 1889-90. But further treaties were made (1) with all the chiefs of the west, south, and north coasts of Nyassa, (2) along the Stevenson Road, (3) on the south and south-west coasts of Tanganika, and (4) inland, round Bangweolo and Moero.

Ras Kasar (18° 2′ N. lat.) to the southern boundary of Raheita,[1] towards Obok. During 1889, shortly after the death of King Johannes, Keren and Asmara were occupied by Italian troops. Menelik of Shoa, who succeeded to the throne of Abyssinia, after subjugating all the Abyssinian provinces except Tigré, despatched an embassy to King Humbert, the result of which was that the new Negus acknowledged (29th September 1889) the Protectorate of Italy over Abyssinia, and its sovereignty over the territories of Massawa, Keren, and Asmara.[2] The Italian Possessions on the Red Sea subsequently received the name of "Eritrea."

Italy has also succeeded in establishing herself on the Somál coast. By treaties concluded (8th February 1889) with the Sultan of Obbia, who belongs to the powerful Mijarten tribe, and (April 7th) with the Sultan of the Mijarten himself, the coastal lands between Cape Warsheikh (about 2° 30′ N. lat.) and Cape Bedwin (8° 3′ N. lat.)—a distance of 450 miles—were placed under Italian protection. Italy subsequently extended (1890) her protectorate over the Somál coast to the Jub River, by taking over the ports of Kismayu, Barawa, Merka, Mukdisho, and Warsheikh, which the British East Africa Company had secured (in addition to Lamu, Manda, and Patta, which the Company retained) through a concession from the Sultan of Zanzibar.[3]

The British Protectorate on the Somál coast facing Aden now extends from the Italian frontier at Ras Hafún to Ras Jibute (43° 15′ E. long.). The island of Sokotra, which was originally acquired by treaty in 1876, was formally annexed in 1886.

In regard to the West Coast of Africa, we have still one or two territorial arrangements to notice. The activity of France in her Senegambian province, which, during the last hundred years, has been marked by notable success, has finally resulted in a considerable expansion of her territories. The native chiefs, one after another, have been forced to submit to the French ascendancy. Captain Binger, by the treaties he concluded with native chiefs during 1887-89, advanced the French sphere of influence down to the Ivory Coast. Thus, the French have established a claim over the country intervening between our Gold Coast Colony and Liberia. A more precise delimitation of the frontier between Sierra Leone and Liberia resulted from the treaty signed at Monrovia on 11th November 1887.

In 1888 Portugal withdrew all rights over Dahomé, her possessions on the Slave Coast having been restricted to the insignificant post of Ajuda.

Between Cape Blanco, which is regarded as the northern coastal limit of Senegambia, and Cape Bojador, Spain has been endeavouring since 1885 to secure her hold on the Saharan coast as a *pied à terre* on

[1] This boundary has not yet been defined.

[2] The treaty thus concluded was similar in kind to the French treaty with the Hova Government in Madagascar. Frontiers were provisionally settled.

[3] The concession was originally made by Saïd Barghash, and was renewed by Saïd Khalifa. It was disputed by Germany; but, the case being referred to the arbitration of Baron Lambermont, the British Company was awarded its rights. Subsequent disputes delayed the concession being effected.

the African mainland for the Canary Islanders; whilst an English company has obtained treaty-rights, by which a claim has been instituted over the remaining coast-line between Cape Bojador and the frontier of Morocco.

These claims to the Littoral of the Sahara will require some adjustment; for, quite recently, a French sphere of influence has been instituted over the whole of the Saharan regions between Algeria and Senegambia. This proclamation resulted from negotiations with Great Britain. By the recent Anglo-German Agreement—to which we shall presently refer—no account had been taken by the Contracting Powers of the old Anglo-French Agreement (1862) respecting the independence of Zanzibar. Utilising this omission as a lever, France very shrewdly negotiated her interests in other parts of Africa, where the complaisance of Great Britain was necessary. Declarations were exchanged [1] between the two Governments, with the following results:—(1) France became a consenting party to the Anglo-German Convention of 1st July 1890; (2) Great Britain recognised the French Protectorate over the island of Madagascar. This island, which had long been the theatre of colonial rivalry between France and Britain, had been placed under French protection by the treaty of 17th December 1885 (which had practically secured the sovereign rights of France), but it had never been formally recognised by Britain. And (3) Great Britain recognised "the sphere of influence of France to the south of her Mediterranean Possessions, up to a line from Say on the Niger to Barrua on Lake Tsad, drawn in such a manner as to comprise in the sphere of action of the British Niger Company all that fairly belongs to the kingdom of Sokoto; the line to be determined by the commissioners to be appointed."

Of even greater importance than the above arrangement with France was the Anglo-German Agreement of July 1890. This Convention attempted to adjust the outstanding rival claims of Great Britain and Germany in Africa. The arrangement was an equitable one, and a diplomatic triumph to its negotiators. The following were the main provisions, and have been given effect to on our map:—

(1.) The Anglo-German frontier in East Africa, which, by the Convention of 1886, ended at a point on the eastern shore of the Victoria Nyanza, was continued on the same latitude across the lake to the confines of the Congo Independent State; but, on the western side of the lake, this frontier is, if necessary, to be deflected to the south, in order to include Mount M'fumbiro within the British sphere.[2] (2.) The southern boundary of the German sphere of influence in East Africa was recognised as that originally drawn to a point on the eastern shore of Lake Nyassa, whence it was continued by the eastern, northern, and western shores of the lake to the northern bank of the mouth of the

[1] The Anglo-French Agreement, signed at London, 5th August 1890.—*Parliamentary Paper: Africa*, No. 9, 1890.

[2] Treaties in that district were made on behalf of the British East Africa Company by Mr. Stanley, on his return (May 1889) from the relief of Emin Pacha.

[3] Anglo-German Convention, 1886, and German-Portuguese Convention, 1886.

river Songwé. From this point the Anglo-German frontier was continued to Lake Tanganika, in such a manner as to leave the Stevenson Road within the British sphere. (3.) The northern frontier of British East Africa was defined by the Jub River and the conterminous boundary of the Italian sphere of influence in Galla-land and Abyssinia up to the confines of Egypt; in the west, by the Congo State and the Congo-Nile water-shed. (4.) Germany withdrew, in favour of Britain, her Protectorate over Vitu and her claims to all territories on the mainland to the north of the River Tana, as also over the islands of Patta and Manda. (5.) In South-West Africa the Anglo-German frontier, originally fixed up to 22° south latitude, was confirmed; but from this point the boundary-line was drawn in such a manner eastwards and northwards (see Map) as to give Germany free access to the Zambezi by the Chobe River. (6.) The Anglo-German frontier between Togo and Gold Coast Colony was fixed, and that between the Cameroons and the British Niger Territories was provisionally adjusted. (7.) The Free-Trade zone, defined by the Act of Berlin (1885), was recognised as applicable to the present arrangement between Britain and Germany, and its stipulations as binding upon both parties. Thus "it is specially understood that, in accordance with these provisions, the passage of goods of both Powers will be free from all hindrances and from all transit-dues between Lake Nyassa and the Congo State, between Lakes Nyassa and Tanganika, on Lake Tanganika, and between that lake and the northern boundary of the two spheres." (8.) A British Protectorate was recognised over the dominions of the Sultan of Zanzibar within the British coastal zone and over the islands of Zanzibar and Pemba. Britain, on the other hand, pledged herself to use all her influence to secure corresponding advantages[1] for Germany within the German coastal zone and over the island of Mafia. Finally (9), the island of Heligoland, in the North Sea, was ceded by Britain to Germany.

The tact and ability with which conflicting claims were thus adjusted by Lord Salisbury were equally conspicuous in his negotiation of the Anglo-Portuguese Convention of 20th August 1890. We have already alluded to the chief points in dispute between Britain and Portugal. Their adjustment—if, perchance, it may be regarded as final—formed the last of a chain of treaties which, it may be hoped, will bind down the European Powers in Africa to "keep the peace" for some time to come.

The boundary-lines laid down by the Anglo-Portuguese Convention are approximately shown on our map: some time must, however, elapse before any precise delimitation of the territories can be made. The adjustment of rival claims, though on the whole favourable to Portugal, has been very fairly carried out. Portugal has obtained the recognition of some of her historical pretensions, and now has ample scope for any possible expansion of her Eastern and Western possessions. In a few words we may broadly distinguish what Britain and Portugal have gained by their compact.

Great Britain acquired a broad Central sphere of influence for the

[1] These have since been obtained.

expansion of her possessions in South Africa northwards to and beyond the Zambezi (which, between the Zumbo district and the Katima Rapids, flows entirely through the British sphere), up to the confines of the Congo Independent State[1] and German East Africa.

Portugal, on the East Coast, secured the Lower Zambezi from Zumbo, and the Lower Shiré from the Ruo confluence, the entire *Hinterland* of Mozambique up to Lake Nyassa,[2] and the *Hinterland* of Sofala, to the confines of the South African Republic and the Matabele kingdom. On the West Coast, Portugal received the entire *Hinterland* behind her provinces in Lower Guinea, up to the confines of the Congo Independent State[3] and the upper course of the Zambezi.

Lord Salisbury, in his negotiations with Germany and Portugal, very wisely upheld the principle of Free Trade, which was laid down by the Act of Berlin, 1885, in regard to the free transit of goods through territories in which two or more Powers are indirectly interested. Thus, by the Anglo-German compact, the Contracting Powers reserved for their respective subjects "a right of way," so to speak, along the main channels or routes of communication. Through the application of the same principle in the recent Anglo-Portuguese Convention, Portugal obtains not only a "right of way" across the British Zambezi zone, but also the privilege of constructing railways and telegraphs. She thereby secures free and uninterrupted connection between her possessions on the East Coast and those on the West Coast. A similar concession is made to Britain in the Zambezi basin, within the Portuguese sphere. Finally, the Zambesi itself has been declared free to the flags of all nations.

Britain has stipulated for the right of pre-emption in the event of Portugal wishing to dispose of territories south of the Zambezi. The transit-dues over Portuguese territories and waterways are not to exceed 3 per cent. *ad valorem*—the same as fixed by the Portuguese Tariff of 1877.

This concludes our view of the political partition of Africa. As a result it will be seen that, south of the Equator, the whole of the continent has been divided among the European Powers; but north of the Equator the internal boundaries are nearly all unsettled. In other words, Pagan Africa is at the present day under the domination of Europe, but Mohammedan Africa remains under Arab or native rule.

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[1] The "confines" of the Congo Independent State require more precise delimitation, since treaties have quite recently (January to June 1890) been concluded between British agents and native chiefs as follows:—In the Barotsé country, and between Nyassa and the Loangwa, in the Angoni country (British South Africa Company), and in Msiri's kingdom (Katanga) by Mr. Alfred Sharpe, acting under instructions from Consul Johnston.

[2] As far south as latitude 13° 30′, whence the frontier is deflected south-east to the eastern shores of Lakes Chiuta and Shirwa.

[3] Belgium, however, disputes the claims of Portugal to Lunda, Kasanje, and other territories to the east of the river Kwango, on the strength of a treaty concluded on 14th February 1885 between the African Association and Portugal, which fixed the Kwango as the conterminous frontier, and of treaties with native chiefs alleged to have been recently made by Belgian explorers. Portugal, on the other hand, disputes the Belgian interpretation of the treaty of 1885 and advances prior claims [treaties made by expeditions under Silva Porto, Carvalho, and others]. Meantime, on 10th June 1890, the district was incorporated (on paper) with the Congo State, under the designation of "Western Kwango." Portugal, however, proposes to extend the railway from Ambaca to Kasanje.

# THE MAPPING OF THE WORLD.

By JOHN GEORGE BARTHOLOMEW, F.R.S.E., F.R.G.S.

## PART II.—AFRICA.—(*With a Map.*)

IN dealing with Africa, the geographer has long been at liberty to indulge his imagination to his heart's content, and the map has consequently undergone corresponding changes. Nearly four hundred years ago the map of the period presented a very complete appearance indeed. It showed an Interior covered with great lakes, rivers, and cities; but whether these were the result of actual exploration or merely of speculation remains a mystery. Later on the accuracy of these wonderful maps of the ancients came to be doubted; and the conscientious cartographer, thinking it wiser to depict only the results of well-authenticated exploration, caused the great rivers and lakes of the Interior to vanish from his map. Until about forty years ago the best map showed little else than the bare coast-line, the great blanks in the Interior suggesting a continuation of the vast deserts that were known to exist in the north. This state of affairs appeared to be a reproach to the enterprise of travellers. Every map displayed our ignorance of Africa, and summoned fearless spirits to go and explore the unknown. The great era of discovery then set in. At first progress was slow, but within the last fifteen years it has been very rapid; and at the present day the dark cloud of mystery has been so far dispersed, that the map again shows an Interior, with great lakes, rivers, and forests, filled in with detail not unlike its predecessor of Ptolemaic origin. Now, scientific men, missionaries, pioneers of commerce, Germans, French, Belgians, Italians, Portuguese, English, and Scotch—all have their energies bent on Africa, exploring and founding settlements. Not a mail arrives but brings from them new *data* for the map of Africa. In Europe the knowledge of territories so valuable for commercial enterprise has led to a keen contest among the Powers for their possession, thus necessitating frequent changes in the political colouring of the map.

In treating of the mapping of Europe, we had the Government surveys of each country as a basis; but in the greater part of Africa civilisation has not yet advanced to the stage of surveys. Only in a comparatively very small area does the mapping approach the perfection of even a general geographical survey. The vast Interior is for the most part delineated from the rough and incomplete route-maps of travellers; but, now that the European States have divided Africa among themselves, we may expect they will immediately map their territories thoroughly. The following table and the accompanying map which I have prepared will give a general idea of what has been done, and of what remains to be done:—

| | | |
|---|---|---|
| Extent of Detailed Survey, | 200,000 | sq. miles. |
| „ Topographical Mapping, | 440,000 | „ |
| „ Detailed Route-Surveys, etc., | 2,300,000 | „ |
| „ General Mapping, largely approximate, | 4,775,000 | „ |
| „ Unexplored Country, | 3,800,000 | „ |
| Total Area of Africa, | 11,515,000 | „ |

These figures speak for themselves, and indicate that the compilation of the map of Africa will be a task requiring the constant attention of the cartographer for a long time to come.

In preparing the present list of the best maps of the various countries with the aid of Mr. Bosse, I have gone upon the system of noting the necessary authorities one would consult in the compilation of complete maps of those countries. The list is necessarily a long one, for, when the special maps of each explorer have not been incorporated in full detail in the general maps, we have been compelled to go to the original sources and to mention each separately; and in some parts of Africa, where travellers have been few, these are of old date. The maps have been roughly classified, according to their geographical value, as follows:—

*A.* Detailed Topographical Surveys.

*B.* General Topographical Maps, compiled from reliable surveys.

*C.* Detailed Geographical Maps, compiled from travellers' itineraries, supplemented by *data* which are only approximate and hypothetical.

* Maps marked with an asterisk cannot rank as original compilations; they are mostly reliable reductions from the best maps, corrected to date and published for popular use.

† Maps which are simply itineraries.

The latest published map is in each case mentioned first.

N.B.—*The maps published by the Intelligence Branch of the War Office in London are not for sale, but most of them may be consulted at the Geographical Societies' Rooms. It may also be explained that many of the maps in our list are only to be had in books of travel and in publications of Geographical Societies.*

## MAPS OF AFRICA.

*Names of Maps published by Governments are printed in italics.*

Only the best and most recent Government and private publications are here mentioned.

| Country. | Title of Map. | Scale. | | Total Number of Sheets. | Date. |
|---|---|---|---|---|---|
| | | Natural Scale. | Miles to Inch. | | |
| **GENERAL MAPS.** | *C. Carte de l'Afrique. Par R. de Lannoy de Bissy. Paris: Serv. géogr. de l'armée. Price 5d.,* | 1:2,000,000 | 31·5 | 64 | 1890 |
| | * Carte d'Afrique par. F. Schrader. Paris: Hachette et Cie., | 1:15,000,000 | 235·3 | 3 | 1890 |
| 1 | * Karte von Afrika von Dr. R. Lüddecke. Gotha: Justus Perthes. Price 10s., | 1:10,000,000 | 157·8 | 6 | 1890 |
| | Karte von Afrika. Von R. Andree und A. Scobel. Bielefeld und Leipzig: Velhagen und Klasing. Price 5s., | 1:10,000,000 | 157·8 | 3 | 1890 |
| | * Stanford's Library Map of Africa. London: Edward Stanford. Price £1, 15s., | 1:5,997,382 | 94·6 | 4 | 1890 |
| | * Political Map of Africa. By J. G. Bartholomew. Edinburgh: J. Bartholomew & Co. Price 1s., | 1:12,000,000 | 189·3 | 1 | 1890 |
| | C. Spezialkarte von Afrika. Entworfen von H. Habenicht, bearbeitet von demselben, Bruno Doman, und Dr. R. Lüddecke. Gotha: Justus Perthes. Price 15s., | 1:4,000,000 | 63·1 | 10 | 1887 |
| | * Neue Uebersichtskarte von Afrika. Von R. Kiepert. Berlin: Dietrich Reimer. Price 1s., | 1:20,000,000 | 315·6 | 1 | 1887 |

1 The best general map of Africa at the present time.

| Country. | Title of Map. | Scale. Natural Scale. | Scale. Miles to Inch. | Total Number of Sheets. | Date. |
|---|---|---|---|---|---|
| **General Maps**—*continued.* | * Karte von Afrika, mit besonderer Berücksichtigung der deutschen Kolonien. Von W. Liebenow. Berlin: Berliner Lithographisches Institut. Price 6s., | 1:10,000,000 | 157·8 | 4 | 1886 |
| | Atlas von Afrika. Mit einem geogr.-statistischen Text. Wien: A. Hartleben. Price 3s., | | | 50 | 1886 |
| | General Map of Africa. Edinburgh and London: W. and A. K. Johnston. Price 15s., | 1:8,420,000 | 132·8 | 4 | 1885 |
| **NORTH AFRICA.** MOROCCO. | * *Marocco. Compiled in the Intelligence Division, War Office,* | 1:1,584,000 | 25·0 | 1 | 1889 |
| | † Map of South-Western Morocco, illustrating Mr. Joseph Thomson's journeys, 1888. Proc. Royal Geogr. Society, | 1:1,000,000 | 15·7 | 1 | 1889 |
| | C. *Morocco: Lannoy de Bissy's l'Afrique. Sheet* 4. *Fez. 5 Laglement.* Price 5d., | 1:2,000,000 | 31·5 | 1 | 1889 |
| | * Carte spéciale du Maroc. Par C. Lasailly. Paris: Challamel, | 1:3,000,000 | 47·3 | 1 | 1888 |
| | † Reconnaissance au Maroc 1883-84. Par Ch. de Foucauld, | 1:250,000 | 3·9 | 20 | 1888 |
| | † Itinéraires au Maroc. Par Ch. de Foucauld. Bull. de la Soc. de Géographie, | 1:1,600,000 | 25·2 | 1 | 1887 |
| | † Route de Fez à Oudjda par le Cte. M. de Chavagnac. Bull. de la Soc. de Geographie, | 1:800,000 | 12·6 | 1 | 1887 |
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| | * Carte générale de l'Algérie d'après celle du Dépôt de la Guerre par V. A. Malte-Brun. Paris, | 1 : 3,200,000 | 50·5 | 1 | 1884 |
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| | *C. Sketch Map of the country adjacent to Suakin. London: Intelligence Branch, War Office,* | 1:100,000 | 1·5 | 1 | 1885 |
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| | † Facsimile of a map drawn by General Gordon, R.E., at Kartum, of his route from Suakim to Berber and Kartum. London: Edward Stanford, | 1:325,000 | 5·1 | 1 | 1885 |
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| | C. Specialkarte vom mittleren Ost-Sudan. Von K. Zoppritz. Petermanns Geogr. Mitteilungen, | 1 : 1,000,000 | 15·7 | .. 1 | 1877 |
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| | * Carta della guerra in Abissinia. Milan: Dott. F. Vallardi. Price 1s., | 1 : 200,000 | 3·1 | 1 | 1888 |
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| | C. Abissinia settentr. Da A. Cecchi, | 1 : 500,000 | 7·8 | 1 | 1888 |
| | Milan. Massaua, | 1 : 250,000 | 3·9 | | |
| | *B. Carta dimostrativa della regione compresa fra Massaua, Keren, Ak um e Adrigat. Florence: Instituto Geografico Militare.* | 1 : 400,000 | 61·5 | 1 | 1887 |
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| | * Carte originale del paese degli Afar o Donakil e regioni limitrofe tra Massaua, Aden, Zeila e la Scioa Nord. Da Guido Cora. Turin: Instituto Geografico Guido Cora, | 1 : 1,500,000 | 23·6 | 1 | 1885 |

[1] Italian name for their new Red Sea colonies, spelt by them "Eritrea."

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| ABYSSINIA, GALLA AND SOMALI COUNTRY. | C. Die Karawanenstrasse Zeila-Ankober und die Grenzgebiete der Somali, Afar und Galla. Von G. E. Fritzsche. Peterm. Geogr. Mitteilungen, | 1 : 1,000,000 | 15·7 | 1 | 1890 |
| | C. Der Südostabhang des abissinischen Hochplateaus. Von Dr. Anton Stecker. Mitt. d. Afrikan. Gesell. in Deutschland, | 1 : 500,000 | 7·8 | 1 | 1889 |
| | * Région comprise entre le Haut-Nil et la baie de Somalie. Par W. Rosier. Genève: L'Afrique Explorée et Civilisée, | 1 : 8,000,000 | 126·2 | 1 | 1889 |
| | † Viaggio di Cesare Hagh da Otumulo a Sciapat. F. Gessi, Milan: Esplorazione commerc., | 1 : 1,000,000 | 15·7 | 1 | 1888 |
| | C. Carta originale della regione tra lo Scioa ed Harar. Vicenzo Ragazzi. Rome: Presso la Societa Geografica Italiana, | 1 : 1,000,000 | 15·7 | 1 | 1888 |
| | C. Carta originale provisoria dell' Urbaragh L. Traversi. Boll. da Societa Geografica Italiana, | 1 : 1,000,000 | 15·7 | .. | 1888 |
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| | C. Royaume de Choa et Pays Gallas. Par A. Aubry, Ingénieur des Mines. Paris: Bulletin de la Société de Géographie, | 1 : 1,650,000 | 26·0 | 1 | 1887 |
| | *C. Somali Country. Calcutta: London. India Office,* | 1 : 1,267,200 | 20·0 | 1 | 1887 |
| | C. Carta originale dei Becciu, Arussi, Maraquo Gurachi, etc. L. Traversi, | 1 : 1,000,000 | 15·7 | 1 | 1887 |
| | C. L'Harar. M. Camperio. Milan: Vallardi, | 1 : 1,000,000 | 15·7 | 1 | 1887 |
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| | C. Da Zeila alle frontiere di Caffa, Capt. A. Cecchi. Rome: Loescher, | 1 : 1,000,000<br>1 : 3,000,000 | 15·7<br>47·3 | 3<br>1 | 1886<br>1886 |
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| | C. Joseph Menges Reisen auf den Hochplateau der Somali-Halbinsel. Petermanns Geogr. Mitteilungen, | 1 : 2,000,000 | 47·3 | 1 | 1885 |
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| | C. Voyage au Pays Çomali. Par G. Révoil, Bull. de Soc. de Geog., . . . | 1 : 1,500,000 | 23·6 | 1 | 1882 |
| | *B. Abyssinia, Line of March of the Army under Lieut.-Gen. Napier of Magdala. London : War Office.* . . . | 1 : 253,440 | 4 | 1 | 1868 |
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| | C. A Map of Sir Samuel Baker's Routes on the Nile Tributaries of Abyssinia. London : E. Stanford, . . . | .. | .. | 1 | |
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| | † Itinéraire de Bammako au Golfe de Guinée à travers les Pays de Kong et du Mossi par le Capitaine L. G. Binger. Paris : Bulletin de la Société de Géographie, . . . . . | 1 : 2,500,000 | 39·4 | 1 | 1889 |
| | † Itinéraires levés dans le Soudan Français par ordre du Lieut. Gallieni. Bull. Soc. Géogr., . . . . . | 1 : 2,060,800 | 32·5 | 1 | 1889 |
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| | Carte du Sénégal et dépendances. Par Largent & Foret. Paris : Challamel. Price 6s. 8d., . . . . | 1 : 40,000 | 0·6 | .. | 1888 |
| | C. Carte du Sudan Français (Gallieni), . | 1 : 750,000 | 11·8 | 1 | 1888 |
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| | C. Voyage à Ségou (Soleillet). Par Gravier. Paris : Challamel, . . . . | 1 : 2,000,000 | 31·5 | 1 | 1887 |
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| | C. Empire Central de Samory. Par Lieut. Plat, Paris, . . . . . | 1 : 750,000 | 11·8 | 1 | 1887 |
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| | * Gallieni's Expedition in die Gebiete am Oberen Senegal & Niger, 1880 & '81. Von B. Domann. Petermanns Geogr. Mitteilungen, . . . . . | 1 : 2,000,000 | 31·5 | 1 | 1882 |
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| | *B. Carte de Kita a Mourgoula.* Price 2s., *Paris: Mission Topographique du Haut Sénégal.* | 1 : 100,000 | 1·5 | 1 | 1882 |
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| | C. Itinéraire de Sierra Leone aux Sources du Niger. Par Zweifel et Moustier. Bulletin de la Société de Géographie, . | 1 : 1,600,000 | 25·2 | 1 | 1881 |
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| | * *Map of the Countries bordering on the Lower Niger and Binueh Rivers. London: War Office,* . . . . . | 1 : 2,787,840 | 44·0 | 1 | 1890 |
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| | C. Croquis du Dahomey et les Régions voisines. Par le Commt. Roch. Price 1s. 6d. Paris: Challamel, . . . . | 1 : 1,360,000 | 21·1 | 1 | 1890 |
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| | C. Aufnahmen des Pr. Lt. Kling auf den Reisen zwischen Bismarckburg und Do. Koffi. (Togo-Gebiet). Mitteilungen von Forschungsreisenden und Gelehrten aus den deutschen Schutzgebieten. Berlin: A. Asher & Co., . . . . | 1 : 710,000 | 11 | 1 | 1889 |
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| | * Carte des établissements français du golfe de Benins. Paris: J. P. Trouillet, | 1 : 400,000 | 6·3 | 1 | 1889 |
| | C. Weg Dr. Zintgrafs u. Lt. Zeuner's bei dem Vorstoss von der Barombi Station nach der Landschaft Banyang (Kamerun). Mitteilungen von Forschungsreisenden und Gelehrten aus den deutschen Schutzgebieten. Berlin: Asher & Co., . . . . . | 1 : 770,000 | 12·1 | 1 | 1889 |
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| | C. Darstellung des Fluss-systems des Meme, Massake, Rio del Rey und Akwa Jafe. Mitt. von Forschungsreisenden und Gelehrten aus den deutschen Schutzgebieten, . . . . . | 1 : 375,000 | 5·9 | 1 | 1888 |
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| | C. Uebersichtskarte von dem Hinterlande des deutschen Schutzg-bietes Togo. Mitteilungen von Forschungsreisenden und Gelehrten aus den deutschen Schutzgebieten. Berlin: Asher & Co., | 1 : 2,225,000 | 35·1 | 1 | 1888 |
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| | C. Route Survey through Yoruba Country. By Harbour-Master W. C. Speeding, Lagos, . . . . . | .. | .. | .. | 1887 |
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| | * United Presbyterian Missionary Map of Old Calabar. Edinburgh and London: W. & A. K. Johnston, . . . | 1 : 930,000 | 14·6 | 1 | 1868 |
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| | C. Sketch Map of the divisions in the Gold Coast Protectorate. London: E. Stanford, . . . . . | 1 : 527,000 | 8·3 | 1 | 1885 |
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| | C. Der Amambara Fluss. Von. R. Flegel. Mitt. d. Afrik. Gesellschaft in Deutschland, . . . . . | 1 : 700,000 | 11·0 | 1 | 1884 |
| | *B. The Settlement of Sierra Leone. By Capt. H. M. Jackson, R.A. London: Intelligence Branch, War Office,* . . . | 1 : 696,960 | 11·0 | 1 | 1884 |
| | * Map of a portion of the Western Province of the Gold Coast Colony. Compiled by R. B. N. Walker and E. W. Benson. London, . . . . | 1 : 645,000 | 2·2 | 1 | 1884 |
| | *C. Map of Routes in Wassaw and Aowin. By Asst. Inspector C. W. Thompson. London: Intelligence Branch, War Office,* . | 1 : 383,160 | 6·0 | 1 | 1884 |

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| | C. St. von Rogozinskis Reisen im Kamerun, Gebiete. Von B. Hassenstein. Petermanns Geogr. Mitteilungen, . . | 1:800,000 | 12·6 | 1 | 1884 |
| | * Die Westafrikanische Küste von Accra bis zum Ogowe. Von R. Kiepert. Berlin: D. Reimer, . . . . | 1:1,000,000 | 15·7 | 1 | 1884 |
| | C. Sierra-Leone und das Timméné-Land nach den Forschungen der Verminokeschen Expedition unter E. Vohsen, Dr. W. Hart u. E. Keller. Petermanns Geogr. Mitteilungen, . . | 1:600,000 | 9·4 | 1 | 1883 |
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| | *B. Map of Ashantee and Gold-Coast. London: Intelligence Branch, War Office,* . . | 1:633,600 | 10·0 | 1 | 1882 |
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| | * Central Africa. By T. B. Johnston, Edin. and Lond: W. & A. K. Johnston, . | 1:10,300,000 | 162·5 | 1 | 1890 |
| | * Die Portugiesische Expedition querdurch Afrika, 1884-85. Petermanns Geogr. Mitteilungen, . . . . | 1:4,000,000 | 63·1 | 1 | 1887 |
| | * *Carta da Africa Meridional Portugueza Coordenada por A. A. d'Oliveira. Lisbon: Commissao de Cartographia,* . . | 1:6,000,000 | 94·8 | 1 | 1886 |
| | *In progress* Map of Western Equatorial Africa, by E. G. Ravenstein, F.R.G.S., prepared under the authority of the Royal Geogr. Society, . . . . | 1:1,000,000 | 15·7 | | |
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| | C. Lake Bangweolo. By E. G. Ravenstein. Scott. Geogr. Magazine, . . . | 1:1,000,000 | 15·7 | 1 | 1889 |
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| | C. Map of the Central Congo Region, illustrating the papers by Captain Van Gèle and Mr. J. R. Werner. Proceed. of the Royal Geogr. Society, . . . . | 1:3,300,000 | 52·0 | 1 | 1889 |
| | C. Aufnahme des Untern Quango. Von Dr. Mense. . . . . | 1:300,000 | 4·7 | 1 | 1889 |
| | C. Dr. R. Büttner's Reise von S. Salvador nach dem Quongo and Stanley Pool. Von R. Keipert. Mitt. der Afrikan Gesel. in Deutschland, . . . . . | 1:500,000 | 7·8 | 1 | 1889 |
| | B. Le Kassai et Louloua de Kwamouth à Louebo, levés à bord du steamer "Stanley," par le capitane Thys, officier d'ordonnance de S. M. le Roi des Belges. Brussels: Institut de Géographie. Price 4s. 6d., . . . . . | 1:200,000 | 3·1 | 1 | 1888 |

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| | C. Das Gebiet der Baschilange Stamme in Central Africa. Von H. Wissmann. Petermann's Geogr. Mitteilungen 1888, | 1 : 1,300,000 | 20·5 | 1 | 1888 |
| | C. Der Ubangi Uelle in seinem Mittellauf von den Songo Stromschnellen bis 22 ostl. v. Greenwich. Aufgenommen von Capitän van Gèle. Petermanns Geogr. Mitteilungen, . . . . . | 1 : 1,500,000 | 23·6 | 1 | 1888 |
| | * Karte des Mittleren Kongo. Von Paul Lunghans. Mitt. d. K. K. Geogr. Gesellschaft in Wien, . . . . | 1 : 4,000,000 | 63·1 | 1 | 1888 |
| | C. Im Innern Afrikas. Von H. Wissmann. Die Erforschung des Kassai. Leipzig: F. A. Brockhaus, . . . . . | 1 : 2,000,000 | 31·5 | 1 | 1888 |
| | C. Karte der Karawanen Routen im Gebiete der Livingstone-Fälle des Unteren Congo. Von O. Baumann Mitt d. K. K. Geogr. Gesell. in Wien, . . | 1 : 400,000 | 6·3 | 1 | 1887 |
| | C. Reconnaissance du Congo Français, . | 1 : 300,000 | 4·7 | 7 | 1887 |
| | C. Silva Porto's Route from Biké to Bakuba. By E. G. Ravenstein. Proc. Royal Geogr. Society, . . . . . | 1 : 2,000,000 | 31·5 | 1 | 1887 |
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| | *C. Carte du Congo Français, dressée en 1887 par ordre, de M. le S. Secrétaire d'Etat au Ministère de la Marine et des Colonies par M. Ch. Rouvier. Price 2s.,* . | 1 : 1,855,000 (central) | 29·0 | 1 | 1887 |
| | *C. Embocadura do Zaire. Reconhecimento Hydrographico para lancamento do cabo submarino Lisbon: Commissao de Cartographia,* . . . . . | 1 : 750,000 | 11·8 | 1 | 1887 |
| | C. Dr. R. Böhms und Paul Reichard's Routenaufnahmen zwischen dem Tanganika See und dem Lualaba. Von R. Kiepert, Mitteilungen d. Afrik. Gesellschaft in Deutschland, . . | 1 : 750,000 | 11·8 | 1 | 1887 |
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| | C. Viages y Trabajes. M. Iradier. Rio Muni, . . . . . | 1 : 400,000 | 6·2 | 1 | 1887 |
| | C. Rio Muni. Coella. Boll. Soc. Geogr. Madrid, . . . . . | 1 : 1,000,000 | 15·7 | 1 | 1886 |
| | † Routenskizze der Deutschen Congo Expedition Kund und Tappenbeck. Zeit. d. Gesell. f. Erdkunde, . . . | 1 : 3,000,000 | 47·3 | 1 | 1886 |
| | C. De Angola á Contra-Corta. Capello et Ivens. Lisbon, . . . . . | 1 : 1,000,000 | 15·7 | 6 | 1886 |
| | C. Originalkarte des Gebietes der Muschi-Congo im Portugiesischen West Africa. Von J. Chavanne. Petermanns Geogr. Mitteilungen, . . . . . | 1 : 400,000 | 6·3 | 1 | 1886 |
| | C. Fleuve Ogôoué. Par L. Mizon, . . | 1 : 100,000 | 1·5 | 1 } | 1886 |
| | ,, ,, Bull. Soc. Géogr., . | 1 : 500,000 | 7·8 | 1 } | |
| | * Die Nebenflüsse des mittleren Kongo, Lulongo, Tschuapa, Mabanga, u. a. Petermanns Geogr. Mitteilungen, . | 1 : 2,000,000 | 31·5 | 1 | 1886 |
| | C. Karte des Kongo-Beckens, bearbeitet und herausgegeben von Dr. R. Kiepert. Berlin: D. Reimer. Price 2s. 6d., . | 1 : 4,000,000 | 63·1 | 1 | 1886 |
| | C. Carte d'Angola. Dressée par les officiers de la marine portuguaise. Price 2s. 6d., Carte du cours du Rio Zaires, de Stanley Pool à l'Océan, dressée par Capello et Ivens. . . . . | 1 : 3,000,000 | 47·3 | 1 | 1886 |
| | | 1 : 410,000 | 6·4 | 2 | 1886 |
| | *C. Carta dos Territorios de Cabinda, Molembo e Massabi. Coordenada por A. A. d'Oliveira, Lisbon: Commissao de Cartographia,* . . . . . | 1 : 750,000 | 11·8 | 1 | 1886 |

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| | *B. Carta da Travessia dos caminhos de ferro e das estradas estudadas e construidas no districto Loanda. Lisbon : A. d'Oliveiro* | 1 : 400,000 | 6·1 | 1 | 1885 |
| | C. The Congo River from Stanley Pool to Bangala, surveyed by George Grenfell and T. J. Comber, 1884, | 1 : 2,117,600 | 33·0 | 1 | 1885 |
| | C. The Congo State and the Founding of its Free State. By H. M. Stanley. London : Low, | 1 : 2,900,000 | 45·7 | 2 | 1885 |
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| | C The River Congo from its mouth to Bolobo. By H. H. Johnston. London, | 1 : 2,500,000 | 39·4 | 1 | 1884 |
| | *C. Carta do Curso do Rio Zaire de Stanley Pool ao Oceano. Coordenada por Capello e Ivens. Lisbon : Commissao de Cartographia Junto do Ministerio da Marinhar a Ultramar.* | 1 : 410,000 | 6·4 | 2 | 1884 |
| | C. Carte de l'Afrique Équatoriale entre le Congo et l'Ougooué. Par Dr. Josef Chavanne. Brussels : Institut National de Géographie. Price 3s., | 1 : 2,000,000 | 31·5 | 1 | 1884 |
| | C. Route der Pogge-Wissmannschen Expedition von Malansche bis zum Tangenyika-See. Von R. Kiepert. Mitte. d. afrik. Gesellschaft in Deutschland, | 1 : 750,000 | 11·8 | 3 | 1884 |
| | C. Skizze des Gebiets zwischen Vivi und dem Kuango mit den Routen von Lieut. Schulze und Dr. Wolff. Von R. Kiepert. Mitt. d. afrik. Gesellschaft in Deutschland, | 1 : 750,000 | 11·8 | 1 | 1884 |
| | C. Karte der Kuango Expedition, aufgenommen, entworfen und gezeichnet von Major von Mechow. Berlin : Asher & Co. Price 3l., | 1 : 81,200 | 1·1 | 25 | 1884 |
| | C. Carte de l'Ogooué et du Congo, pour suivre les voyages de M. de Brazza. Paris, | 1 : 2,000,000 | 31·5 | 1 | 1884 |
| | * Uebersichtskarte der neusten Forschungsreisen im äquatorialen West-Afrika Von B. Hassenstein. Petermanns Geogr. Mitteilungen, | 1 : 5,000,000 | 78·9 | 1 | 1883 |
| | C. Le Congo depuis l'Equateur jusqu'à l'Océan et la Vallée du Niadi-Kwilu. Brussels : Institut National de Géographie, | 1 : 1,300,000 | 20·5 | 1 | 1883 |
| | C. Map of the Southern Part of Portuguese Possessions on the West Coast of Africa to illustrate the Earl of Mayo's journey. Proceedings of the Royal Geogr. Society. Price 1s. 6d., | 1 : 1,774,080 | 28·0 | 1 | 1883 |
| | C. Carte provisoire des Itinéraires de M. S. de Brazza. Dans l'Ogooué, le Congo et le Niari. Paris, | 1 : 1,600,000 | 25·2 | 1 | 1882 |
| | C. Sketch Map of Explorations in the neighbourhood of St. Salvator (Congo) by Rev. T. Comber. Proceedings of the Royal Geographical Society, | 1 : 1,400,000 | 23·0 | 1 | 1881 |
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| | C. Deutsch Ost-Afrika. Von Brix Förster. Leipzig, . . . . . | 1 : 1,000,000 | 15·7 | 1 | 1890 |
| | † Sketch Map of a Journey to the Upper Tana. By J. R. W. Pigott. Proceedings of the Royal Geogr. Society, . | 1 : 2,000,000 | 31·5 | 1 | 1890 |
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| | C. A Map of part of Eastern Africa, prepared by authority of the Imperial British East Africa Company. By E. G. Ravenstein. London: G. Philip & Son. Price 12s., . . . . | 1 : 500,000 | 7·8 | 9 | 1889 |
| | C. Originalkarte von Usambara. Von Dr. O. Baumann. Petermann's Geogr. Mitteilungen, . . . . . | 1 : 400,000 | 6·3 | 1 | 1889 |
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| | C. Originalkarte von Joachim Graf Pfeils Reiseroute durch Usegnha. Petermanns Geogr. Mitteilungen, . . | 1 : 1,000,000 | 15·7 | 1 | 1888 |
| | * Uebersichtskarte von Ost. Afrika. Von. Kiepert. Berlin: Dietrich Reimer. Price 2s., . . . . . | 1 : 8,000,000 | 126·2 | 1 | 1887 |
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| | C. A Map of Eastern Equatorial Africa, between Lat. 10° N. and 20° S., and East of Long. 25°. Compiled by E. G. Ravenstein, F.R.G.S., and published under the authority of the Royal Geographical Society. London: Edward Stanford. Price 25s., | 1 : 1,000,000 | 15·7 | 25 | 1882 |
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| | † Sketch Map of the Rufiji from a Survey by W. Beardall. Proceedings of the Royal Geogr. Society, | 1 : 558,195 | 8·8 | 1 | 1881 |
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| | † Preliminary Map of a Journey to Lake Kilwa. By H. E. O'Neill. Proceedings of the Royal Geogr. Society, | 1:1,000,000 | 15·7 | 1 | 1884 |
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| | *B. Map of South Africa. London: Intelligence Branch, Quartermaster-General's Department,* . . . . . | 1 : 633,600 | 10·0 | 4 | 1879 |
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| | B. Map of the Klerksdorp Goldfields, situated in the district of Potschefstroom. London: E. Stanford. Price 8s., | 1:576,000 | 9·09 | 1 | 1889 |
| | * Stanford's Map of the Transvaal Goldfields, British Zululand, Delagoa Bay Railway, and the Routes from Cape Colony and Natal. London: E. Stanford. Price 8s., | 1:1,023,970 | 16·1 | 1 | 1889 |
| | C. Map of the Transvaal Goldfields. London, | 1:834,000 | 13·1 | 1 | 1888 |
| | B. Transvaal and Zwasi Goldfields. By Raddatz. Capetown: Solomon, | 1:500,000 | 7·8 | 1 | 1887 |
| | B. Map of the Pretoria and Heidelberg Goldfields. By G. A. Troye, Pretoria, | 1:280,000 | 4·4 | 1 | 1887 |
| | B. Map of the De Kaap and Komatie Goldfields and all adjoining properties. By G. A. Troye. London: J. W. Anderson & Co., | 1:240,000 | 3·7 | 1 | 1887 |
| | C. Carte des Districts du Zoutpansberg et de Lorenzo Marquez, dressée par H. Berthoud. Geneva: F. Noverraz et Fils, | 1:925,000 | 14·5 | 1 | 1887 |
| | C. Das untere Olifant-Becken (S. A. R.) Mit besonderer Berüchsichtigung der Eingeborenen Bevölkerung, von Dr. H. Raddatz. Petermanns Geogr. Mit. | 1:600,000 | 9·4 | 1 | 1886 |
| | C. Kartenskizze von Zululand und den Goldfeldern der Südafrikanischen Republik. Von H. Haevernick. Petermanns Geogr. Mitteilungen, | 1:1,850,000 | 29·1 | 1 | 1885 |
| | *B. Map of the South-Western Frontier of the South African Republic, including the adjacent portions of Bechuanaland, Griqualand West, and the Orange Free State. London: Intelligence Branch, War Office,* | 1:633,600 | 10·0 | 1 | 1885 |
| | B. Map of the Lydenburg Gold Fields. London: E. Stanford. Price 10s. 6d., | 1:233,600 | 3·6 | 2 | 1883 |
| | *C. Sketch Map showing Lines of Communication between Newcastle and the Transvaal. London: Intelligence Branch, War Office,* | 1:253,440 | 4·0 | .. | 1881 |
| | *B. Map of the Transvaal. London: Intelligence Branch, War Office,* | 1:633,600 | 10·0 | .. | 1880 |
| | *C. Sketch Map of a portion of the Transvaal, showing Sekukuni's Territory. London: Intelligence Branch, Quartermaster-General's Department,* | 1:633,600 | 10·0 | 1 | 1879 |
| | *C. Sketch Map of a portion of the Transvaal, showing Sekukuni's Territory. London: Intelligence Branch, Quartermaster-General's Department,* | 1:253,440 | 4·0 | 1 | 1879 |
| | *C. Sketch of the Lulu Mountains, Sekukuni's Territory. London: Intelligence Branch, Quartermaster-General's Department,* | 1:253,440 | 4·0 | 1 | 1879 |
| **AFRICAN ISLANDS.** | *C. Madagascar. Lannoy de Bissy's l'Afrique. No.* 47, 51, 52, 56, 57, | 1:2,000,000 | 31·5 | 5 | 1889 |
| MADAGASCAR. | * Carte de Madagascar. Par L. Laillet et L. Suberbie. Paris: Challamel, | 1:1,000,000 | 15·7 | 3 | 1889 |
| | C. Carte de Madagascar, dressée par le Père D. Roblet, S. J. Missionaire de Madagascar. Paris: H. Oudin et H. Lecene, | 1:1,000,000 | 15·7 | 1 | 1888 |
| | † Itinerari di Due Viaggi al Madagascar, eseguiti dall'ingl. E. Cortese, | 1:1,000,000 | 15·7 | 1 | 1889 |
| | * Carta dell' Isola Madagascar (Geological). Rome: Bulletino della Societa Geografica Italiana, | 1:8,000,000 | 145·6 | 1 | 1889 |

| Country. | Title of Map. | Scale. Natural Scale. | Scale. Miles to Inch. | Total Number of Sheets. | Date. |
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| **African Islands** —*continued.* MADAGASCAR. | * A Map of Madagascar (Madagaskara). By Captain S. Pasfield Oliver, F.S.A., F.R.G.S., late Royal Artillery. London: Macmillan & Co., | 1:2,661,120 | 42·0 | 1 | 1887 |
| | C. Madagaskars Sydostkyst. A. Valen & P. Nilsen, Stavanger, | 1:750,000 | 11·8 | 1 | 1887 |
| | C. Lacs et lagunes de la côte orientale de M. Par A. Grandidier, . . . Bulletin de la Société de Géographie. Paris, | 1:500,000 | 7·8 | 1 | 1886 |
| | * Carte de Madagascar, dressée par A. Grandidier. Paris. Price 2s., | 1:6,000,000 | 94·2 | 1 | 1884 |
| | C. Map of South-Eastern Provinces of Madagascar, comprising part of the Tanala, Betsileo and Bara country. Proceedings of the Royal Geog. Soc., | 1:487,872 | 7·7 | 1 | 1882 |
| | C. Esquisse d'une Carte de la Province d'Amerina (Madagascar) dressée par Alfred Grandidier. Paris, | 1:200,000 | 3·1 | 1 | 1880 |
| | C. Part of Madagascar from the latest Surveys. By Joseph Mullens, D.D., | 1:760,320 | 12·0 | 1 | 1877 |
| | C. West Central Madagascar. By Joseph Mullens, D.D., | 1:760,320 | 12·0 | 1 | 1877 |
| | C. South-East Madagascar and the Tharas Country. By Joseph Mullens, D.D. London: Journal of the Royal Geogr. Society, | 1:760,320 | 12·0 | 1 | 1877 |
| | C. The Central Provinces of Madagascar. By Joseph Mullens, D.D. London: Journal of the Royal Geogr. Society, | 1:760,320 | 12·0 | 1 | 1875 |
| | † Sketch Map of North-East Madagascar, showing route of Rev. T. A. Hulder, | .. | .. | .. | 1876 |
| SOCOTRA. | C. Map of Socotra (B. Balfour). Trans. Royal Soc. Edinburgh, | 1:250,000 | 3·9 | 1 | 1888 |
| | *B. Socotra Admiralty Chart. Price* 2s. 6d., | 1:730,000 | 11·3 | 2 | 1889 |
| COMORO ISLANDS. | *B. Comoro Is. Admiralty Chart. Price* 2s. 6d., | .. | .. | 1 | 1889 |
| | C. Die Westlichen Komoren. Von Paul Langhans. Petermanns Geogr. Mitteilungen, | 1:333,333 | 5·2 | 1 | 1890 |
| | *B. Seychelle and Amirante Is. Admiralty Chart. Price* 2s. 6d., | 1:730,000 | 11·5 | 1 | 1883 |
| RÉUNION. | * *Ile de Réunion. D'après la Carte de C. Maillard* (1861), *et celle des Frères de l'Ecole Chrétienne* (1883). *Lannoy de Bissy's l'Afrique, No.* 57, | 1:260,000 | 4·0 | 1 | 1889 |
| ,, | * Réunion on Habenicht's Karte von Afrika, No. 10, | 1:1,000,000 | 15·7 | .. | 1887 |
| ,, | * Carte d'Ile de la Réunion. Paris: Chaix, | 1:3,000,000 | 4·7 | 1 | 1884 |
| MAURITIUS. | * Mauritius on Habenicht's Karte von Afrika, No. 10, | 1:1,000,000 | 15·7 | .. | 1887 |
| ,, | * Map of Mauritius. By M. Fraser. London: E. Stanford, | 1:126,720 | 2 | 1 | 1885 |
| CANARY ISLANDS. | C. Die Canarischen Inseln Gomero, Hierro, Canaria. Von K. v. Fritsch. Petermanns Geogr. Mitteilungen, | 1:220,000 | 3·4 | 1 | 1868 |
| FERNANDO PO. | C. Karte der Insel Fernando Po. Von Oscar Baumann. Petermanns Geogr. Mitteilungen, | 1:200,000 | 3·2 | 1 | 1887 |
| PRINCES I. | *B. Carta da Ilha do Principe. Coordenada por Ernesto de Vascellos. Lisboa: Commissão de Cartographia,* | 1:100,000 | 1·5 | 1 | 1886 |
| ST. HELENA. | *B. St. Helena. Admiralty Chart. Price* 2s. 6d., | 1:28,185 | .. | 1 | 1886 |
| ,, | * *Ile Ste. Hélène. D'après la Marine anglaise. Lannoy de Bissy's l'Afrique,* No. 62, | 1:71,223 | 1·1 | 1 | 1886 |
| ASCENSION. | *B. Ascension. Admiralty Chart. Price* 1s. 6d., | 1:36,518 | .. | 1 | 1881 |
| ,, | * *Ile de l'Ascension. D'après l'hydrographique anglaise. Lannoy de Bissy's l'Afrique, No.* 61, | 1:60,000 | 0·9 | 1 | 1886 |
| ST. THOMAS. | *B. Ilha de São Thomé. Commissão de Cartographia. Lisboa: Soc. geogr.,* | 1:150,000 | 2·3 | 1 | 1889 |
| ,, | * Carte de l'Ile de St. Thomé, côte occidentale d'Afrique. 1s. 6d., | 1:150,000 | 2·3 | 1 | 1886 |

| Country. | Title of Map. | Scale. | | Total Number of Sheets. | Date. |
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| | | Natural Scale. | Miles to Inch. | | |
| **African Islands** —*continued.* | C. Ilha de St. Thomé. Von Prof. Dr. R. Greef und Francisco José de Aranjo. | | | | |
| ST. THOMAS. | Petermanns Geogr. Mitteilungen, | 1 : 250,000 | 3·9 | 1 | 1884 |
| CAPE VERDE ISLANDS. | *B. Cape Verde Islands. General Admiralty Chart. Price 2s. And 12 special charts of separate islands. Price 6d. each,* | .. | .. | .. | 1889 |
| ,, | *B. Carta da Ilha da Santo Antão (Cabo Verde). Coordenado por Ernesto de Vasconcellos. Lisboa: Commissão de Cartographia,* | 1 : 100,000 | 1·5 | 1 | 1887 |
| ,, | *B. Cabo Verde: Ilha da Boa Vista. Lisboa: Commissão de cartographia,* | 1 : 100,000 | 1·5 | 1 | 1888 |
| ,, | *A. Ilha de S. Thiago. Plano hydrographico do Porto da Praia, Archipelago de Cabo Verde. Lisboa: Commissão de Cartographia,* | 1 : 8,000 | 0·1 | 1 | 1886 |
| ,, | *B. Ilha da São Nicolao,* do., | 1 : 100,000 | 1·5 | 1 | 1888 |
| ,, | *B. Ilha da São Vicente,* do., | 1 : 100,000 | 1·5 | 1 | 1888 |
| ,, | *B. Ilha da Santa Luzia,* do., | 1 : 100,000 | 1·5 | 1 | 1888 |
| ,, | *B. Ilha do Sal,* do., *Lisboa: Commissão de Cartographia.* | 1 : 100,000 | 1·5 | 1 | 1888 |

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## MEMORIAL of the Council of the Royal Scottish Geographical Society to the Commissioners appointed by Parliament in the Universities (Scotland) Act, 1889.

The Council of the Royal Scottish Geographical Society, understanding that the Universities Commissioners are at present engaged in considering the rearrangement of the Faculties and the Curricula in the Scottish Universities, takes the opportunity to press on them very urgently the claims of Geography to be recognised as a department of the Higher Education.

The adequate recognition of Geography in that respect implies, in the opinion of the Council—

(*a*) That Geography should be included in every University Preliminary or Entrance Examination, and should be accepted as one of the optional Pass Subjects qualifying for a Degree in Arts and in Science.

(*b*) That provision should be made for the systematic teaching of Geography within the Universities, or within one or more of them, by the foundation either of Professorships or of Lectureships, fully equipped with the necessary apparatus in maps, charts, globes, and models.

I. In order to make the position of the Council in this matter clear, it is necessary, in the first place, to explain briefly what the Council understands Geography to mean and to comprise.

It may be admitted at once that Geography, as popularly understood, and as too frequently taught in Schools—implying as it does little more than a memorised knowledge of names and places—has no claim to be recognised as a University subject, or indeed as a subject of Education in any true sense. That, however, is

not the kind of Geographical study that the Council seeks to encourage. The Society has shown, by its system of Examinations in Schools during several years past, that it aims at promoting more systematic, more scientific, and more useful methods of teaching the subject than those that prevail at present. Indeed, the conviction that little improvement can be looked for in this respect until the country has been furnished with a supply of teachers competent to treat the subject at once as a valuable body of knowledge, and as a powerful instrument of intellectual development, is one of the main reasons which have led the Council to urge the recognition of Geography as a University subject.

By Geography in that sense the Council understands a complete and systematic knowledge of the Earth's surface—including land, sea, and air—as the theatre of human energy, and of the laws which regulate Man's relations to his physical surroundings.

To the same effect, though more detailed, is the definition of Dr. Archibald Geikie, which is as follows :—

"Geography, looked at from the scientific side, is not itself a science, but rather a department in which various sciences are co-ordinated in such a way as to present a vivid picture of the different regions of the world, and a clear statement of the causes that determine the resemblances and contrasts of these regions. The forms of the land and their origin, the climates of the globe, the distribution of plants and animals, and the causes that have regulated it, the influence of the variations of climate, soil, and topography upon the history of man, the reaction of man upon nature—these, and a thousand other connected problems, form the subject of the highest kind of Geography."

That is the kind of Geography that the Council wishes to promote in the Scottish Universities, and through them in Scottish Schools of every grade. The subject is undoubtedly wide enough to afford material for several courses of lectures. It includes :—

Mathematical and Astronomical Geography.
Physiography, including Meteorology.
Topography.
Commercial and Industrial Geography.
Historical Geography.
Ethnography.

It has also very close relations with

Geology.
Botany.
Zoology.
Sociology.

The Council thoroughly agrees with Dr. Geikie, when he adds to his definition of the scope of Geography, that—

"Such a theme, invested with so much deep human interest, possesses a peculiar value in Education. Indeed I know of no other that lends itself so effectively to the teacher who wishes to inspire his pupils with some appreciation of the nature and value of scientific observation and reasoning."

II. Regarded in this wide sense, the Study of Geography is of value—

(1.) *As a body of knowledge.*—It widens the field of interest in the physical aspects of Nature, and in the political, social, and religious affairs of Man.

(2.) *As an intellectual training.*—It exercises the reasoning faculty in tracing phenomena to their producing causes. It exercises the judgment in determining the particular causes, single or combined, to which a particular effect is to be ascribed. It exercises the imagination in the effort to realise scenes of grandeur and beauty.

(3.) *As helpful to the study of other departments of knowledge.*—It is essential, for example, to the study of Geology, and of History ; and it is an invaluable aid in the study of Zoology, Botany, and Astronomy, while the knowledge of these Sciences also reacts on and enlarges the study of Geography.

(4.) *As an aid to Industrial and Commercial development.*—It conveys a systematic knowledge of the productions of the different regions of the Earth, vegetable and mineral, and of the laws which regulate their interchange.

(5.) *As Technical training for Teachers.*—It affords an admirable means of practising the art of communicating knowledge and of training the mind. Indeed, the British Association, in a recent report (Chemical Section, 1889), pronounced Physical Geography to be the best form of elementary science for educational purposes.

III. Professorships or Lectureships of Geography would be of value—

(1.) As a means of teaching the principles of Geography in general.

(2.) As a means of calling attention to, and of furnishing accurate information regarding, regions and places which from time to time acquire special prominence.

(3.) As a means of encouraging research, and of furnishing advice for the guidance of Explorers and Specialists.

(4.) As a means of giving an impetus to the scientific teaching of Geography, and of furnishing the country with competent teachers.

(5.) As a means of training and inspiring a staff of competent scientific observers among the men who are led to visit remote parts of the world in the prosecution of their professional work, as Doctors, Missionaries, Engineers, Merchants, Teachers, Explorers, and Officers in the Public Services.

IV. A brief account of what is done for the systematic study of Geography in the Universities of other countries may serve to remind the Commissioners how wide and how valuable is the field which that subject opens up ; how attractive is the line of study and of research, and by contrast, how lamentably deficient the Scottish Universities are in the means of promoting this branch of Education.

In Germany, Professorships of Geography are established in the Universities of Berlin, Bonn, Breslau, Göttingen, Greifswald, Halle, Jena, Kiel, Königsberg, Leipzig, Marburg, Münster, and Strassburg ; and Lectureships in Würzburg, and Freiburg.

In France, Chairs of Geography, under the control of the University of France, are attached to the *Facultés des Lettres* at Paris, Bordeaux, Caen, Lyons, Toulouse Aix, Douai, Grenoble, Montpellier, Besançon, Dijon, Nancy, and Lille ; while at Clermont-Ferrand the Chairs of History and Geography are combined, and at Marseilles a Professorship of History and Commercial Geography is attached to the *Faculté des Sciences.*

In Austria-Hungary there are Chairs of Geography in ten Universities, including those of Vienna, Prague, Buda-Pest, and Innsbruck.

Italy has eleven University Chairs of Geography, namely those of Bologna, Florence, Genoa, Milan, Naples, Padua, Palermo, Pavia, Pisa, Rome, and Venice.

In Switzerland, there are similar Chairs at Bern, Geneva, Neuchâtel, and Zürich.

Russia, the Netherlands, and Denmark have each one University Chair devoted to this subject.

The Appendix to this Memorial contains an abstract of the courses of study in Geography in four of the leading Universities of Germany.

The great English Universities have lately been awakened to the necessity of meeting the claims of Geography as a systematic study, helpful to History on the one hand, and to the co-related Physical Sciences on the other. Both Oxford and Cambridge have now Lectureships of Geography, and although these do not yet form integral parts of any authorised curriculum, they are already exciting much interest in the study, and promoting a taste for research.

In Owens College, Manchester, Geography is regularly taught, both on its historical and on its scientific side.

It is not creditable to Scotland—which takes a foremost place for Educational advancement among the nations of Europe—that it stands among those less enlightened countries in which this most human, most useful, and most inspiring study is practically ignored.

Strongly impressed with these views, the Council of the Royal Scottish Geographical Society feels warranted in urging the Universities Commissioners to give effect to the prayer of this Memorial, and by doing so to remove a reproach which attaches to the system of the higher education in Scotland.

*Signed by authority and in the name of the Council,*

ARGYLL, *President of the Society.*

2*d October* 1890.

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## APPENDIX.

### Geography Lectureships in certain German Universities.

**LEIPZIG.**—*Summer Session* 1890.

*C.* Department of History (including History of Civilisation) and Geography.

General Political Geography (with special reference to Europe and the Colonies), by Dr. Ratzel, on five days a week.

Mountain-Study (Gebirgskunde), by Dr. Hettner, lectures of two hours each, at specified times.

In the Royal Geographical Seminary.—Geographical exercises and work ; exercises in map-drawing and map-reading ; by Dr. Ratzel, at specified times. (*Free.*)

*G.* Department of Natural Sciences.

Geographical Distribution of Animals, by Dr. Carus. Twice weekly.

**LEIPZIG.**—*Winter Session* 1890-91.

*C.* Department of History and Geography.

Germany and German Possessions, by Dr. Ratzel. Twice weekly.

Africa, by Dr. Ratzel. Four days weekly.

Geography of S. America, by Dr. Hettner. Two-hour Lectures.

At the Geographical Seminary, by Dr. Ratzel. Geographical Exercises, twice weekly ; map-drawing and map-reading, twice weekly. (*Free.*)

**GÖTTINGEN.**—*Winter Session*, 1890-91.

Natural Sciences.

Geographical Distribution of Plants, by Professor Peter, three days a week.

EARTH-KNOWLEDGE.

General Earth-Knowledge, Part II., Morphology, the Earth's Surface, Oceanography, Climatology, by Professor Wagner. Four times a week.
Cartographical Course for Beginners, by Professor Wagner. Once a week.
Conversational Class of Geography, by Professor Wagner. (*Free.*)

**BERLIN.**— *Winter Session*, 1890-91.

NATURAL SCIENCES.

Physics of the Earth—general summary of the physical phenomena of the Earth, especially its mechanical conditions, by Professor Weinstein. Twice weekly. (*Free.*)

(Numerous courses on Meteorology and Climatology.)

Geographical Distribution of Plants in Europe, by Professor Ascherson. Three times a week.
Geographical Distribution of Plants in the Nile District, by Professor Ascherson. Once a week.

HISTORY AND GEOGRAPHY.

History of Earth-Knowledge and of Geographical Discovery, by Professor Kiepert. Four times a week.
Geography of Asia, by Professor von Richthofen. Four times a week.
Italy, by Professor Kiepert. Twice a week. (*Free.*)
Geographical and Economical Conditions of the German Possessions, by Dr. Dove. Twice a week.
Conversational Class of Geography, by Professor von Richthofen. Once a week. (*Free.*)
Selected Chapters of general Ethnology, by Dr. von den Steinen. Weekly. (*Free.*)

**HALLE-WITTENBERG.**—*Summer Session*, 1890.

NATURAL SCIENCES.

The Methods of Geographical Research and Instruction, by Professor Kirchhoff. Weekly. (*Free.*)
General Earth-Knowledge, by Professor Kirchhoff. Four times a week.
General Morphology of the Earth's Surface, by Dr. Schenck. Twice a week.
North Germany, by Dr. Kirchhoff. Once a week.
Geography of the Polar Regions, by Dr. Ule. Twice a week.
History of the Discovery and Colonisation of Africa, by Dr. Schenck. Weekly. (*Free.*)
Palestine, illustrative of Scripture History, by Professor Kirchhoff. Weekly.
Selected Chapters of Climatology, by Dr. Ule. Weekly. (*Free.*)
Exercises in the Study of Earth-Knowledge, by Dr. Kirchhoff. Weekly. (*Free.*)
Exercises in Geography and Topography, by Dr. Ule. Weekly.
Practical Meteorology, by Dr. Ule. Weekly.

**HALLE-WITTENBERG.**— *Winter Session* 1890-91.

Australia, America, and Africa, by Professor Kirchhoff. Four times weekly.
Geography of the Polar Regions, by Dr. Ule. Twice weekly.
History of the Civilisation of Japan, by Dr. Brauns. Weekly. (*Free.*)
Selected Chapters of general Earth-Knowledge, by Dr. Ule. Weekly. (*Free.*)
Physical Geography of the Alps, by Dr. Schenck. Twice weekly, by arrangement.
The German Colonies, by Dr. Schenck. Weekly. (*Free.*)
Exercises at the Geographical Seminary, by Dr. Kirchhoff. Weekly. (*Free.*)
Conversational Class of Geography, by Dr. Kirchhoff. Weekly. (*Free.*)
Exercises in Map Drawing, etc., by Dr. Ule. Weekly.

# GEOGRAPHICAL NOTES.

## EUROPE.

**The Population of Belgium.**—*Globus*, Bd. lviii., No. 4, gives the official returns at Dec. 31st, 1889, according to which the population of Belgium, at that date, was 6,093,798. The numbers of the inhabitants of the provinces were as follows :—Brabant, 1,119,160 ; Hainault, 1,058,752 ; East Flanders, 952,835 ; Liége, 751,005 ; West Flanders, 741,637 ; Antwerp, 687,699, Namur, 339,800 ; Limburg, 224,474 ; and Luxemburg, 218,436. The population of Brussels, including its suburbs, was 477,398, and of the town alone, 182,275.

**The Lake of Constance.**—The soundings recently taken by Swiss engineers show that the greatest depth in this lake lies 826½ feet below the average surface of the water. This point was found, not as anticipated between Friedrichshafen and Rorschach, but nearly in the middle of the lake between Immenstaad and Utwyl. Near Ueberlingen a depth of 459 feet was sounded. From the island of Lindau a ridge, submerged not much below the surface, runs across the lake to the convent of Mehrerau in Vorarlberg.—*Globus*, Bd. lviii., No. 4.

**A Submerged City.**—Advices from Trieste bring information that a submerged city has been discovered between Grado and Pola in Istria, which very likely will prove to be the ruins of the town of Cissa, mentioned by Pliny and Decimus Secundinus as situated upon an island of the same name. The position of its site being doubtful, considerable interest has frequently been evoked by attempts to identify it, which, however, have hitherto failed. A diver, who has examined the newly discovered remains, reports that the walls of buildings and streets can be clearly traced, and that he followed a sea-wall for 100 feet, and might have been able to proceed along it for a greater distance, had not the apparatus which supplied him with air prevented his further progress, while the depth of water beyond the wall forbade any attempt to examine its frontage. No signs of doors or windows were observed ; but these, he considered, were blocked up and hidden by *débris* and marine growths. Further investigations are to be carried out, which, it is hoped, will do much to clear up the mystery that has so long hung over Cissa, its position, and its fate.

## AFRICA.

**The Sahara.**—M. F. Foureau, well known for the important services he has rendered by sinking wells in the Wed Rir, has made an excursion into the most southern part of the Algerian Sahara, trusting for safety to the widespread popularity he has acquired. From the Wed Igharghar he proceeded at first towards the east, and then turned south-westwards through the sandhills of the Erg to the Mader country, into which numerous *wadis* descend from the Tademait plateau. He also crossed the plateau almost to the slope bounding the Tidikelt oasis, and returned by a direct route to the north-east. He has established the fact that between Biskra and In-Salah there is no serious obstacle to the construction of a railway, but, before anything can be undertaken in the Sahara, the Tuareg must be reduced to submission. M. Foureau's surveys, which are based on thirty-five observations for latitude and longitude, contain a large amount of new material for maps.—*Petermann's Mitt.* Bd. 36, No. ix.

**Eritrea.**—A supplementary convention has been concluded between the King of Italy and King Menelik, the text of which is given in the *Bol. della Soc. Afr.*

*d'Italia*, May-June, 1890. In article 2 King Menelik recognises the sovereignty of Italy over all the territory that is included under the name of Italian Possessions on the Red Sea. Since, at the date of the ratification of the treaty (October 1st, 1889), Adua, the capital of Tigré, was occupied by Italian troops, *Petermann's Mitteilungen* affirms that that country will be added to the Italian Possessions, and that the Takazze will become the southern boundary of the colony. The *Bol. della Soc. Africana* (Naples), July-Aug. 1890, states, however, that King Menelik has given Tigré to Ras Mangasha.

**Senegambia; Rivières du Sud.**—This colony contains 30,000 inhabitants, of whom 7000 are Nalu, while the remainder consists of Baga and other tribes who recognise Dinah Salifu as their chief. Nearly 20,000 acres are under cultivation. The principal products are rice, maize, sesamum, groundnuts, almonds, and palm oil. Their value, in 1889, was £145,500, the net profit being about half that sum.—*Revue Française et Exploration*, August 1st, 1890.

**The Congo.**—Two travellers have lately traversed the country between the Upper Congo and the Wellé (*vide Mouvement Géog.*, July 6, 1890). Captain Becker started from Yambuya on the Aruwimi, and reached the Wellé a little above Junker's furthest, near Ali Kobbo's village, after twenty-four days' march through forest. He crossed first the Lulu, the tributary of the Aruwimi discovered by Delcommune, which was about 55 yards broad; then the Rubi, which has not yet been explored above the falls. Captain Becker did not hear it spoken of as the Itimbiri or Loika, the former being simply the name of a chief who lives on one of its tributaries. The latter is, no doubt, the name of the lower course of the river, while the upper is called Lubi or Rubi. A little below the falls, which put a stop to Grenfell's further progress, the Rubi receives the Rukitti through its left bank, and a little above the falls the Tinda through the right; still further up, the Tere through the left and the Riketti through the right bank. All this part of the river's course is obstructed by falls. Captain Becker followed the last-named tributary to within three days' march of the Wellé, and left it when it had diminished to a stream of some 50 yards broad. Captain Roget started from the Loika, and reached the Wellé about where Becker subsequently struck it, where he found an establishment for the purchase of ivory, set up by a retired soldier of the Mahdi; and he founded a station of the State. Particulars of his journey have not yet been received.

M. Crampel, the French explorer, intends to march from the northern bend of the Wellé towards the Shari, and to follow this river to Lake Tsad, and thus determine the watershed between the basins of the Congo and Lake Tsad. It is possible, also, that his journey may lead to important political results. He will, if possible, return across the Sahara, but, should the Tuareg block that route, he will make for the Benué.—*Petermann's Mitt.* Bd. 36, No. viii.

**Somál-land.**—Captain E. Baudi de Vesme has given a few details of his travels in a letter to the African Society of Italy (*Bol.*, May-June, 1890). He set out from Berbera on April 12th, and found nothing worth recording until after he had passed Burao. Following the course of the Tug Dehr, he marched through Bayodoval and other villages to Bair, the chief settlement of the Habr Tijaleh, where four to five thousand persons were dwelling. Forced by repeated attacks of the Mahmud Gherad to leave the banks of the stream, he turned southwards, and went a little beyond the Bur Dass mountains to the northern boundary of the Nogal, where dwell the Gherad Fara. From information received from the natives Captain Baudi de Vesme infers that the course of the Tug Dehr is very incorrectly represented on existing maps.

## AMERICA.

**The Pilcomayo.**—Another attempt has been made to open the Pilcomayo route between Bolivia and the Argentine Republic. The *Times*, Sept. 22, 1890, relates that Captain Page left Buenos Ayres at the end of last year in a small steamer, the *General Paz*, and, having ascended the Pilcomayo for some distance, transferred his baggage to the *Bolivia*, a stern-wheel vessel built on the Clyde for the use of this expedition. Before the party reached the Paliño (Patina) swamp provisions began to fail, and here they frequently lost their way among the numerous branches of the river. The *Times* goes on to say that one of the party was sent down the river to fetch provisions. From information we have received through the friends of Mr. Graham Kerr, the naturalist of the expedition, this statement appears to be correct, and also that Captain Page was brought down to Corrientes in a dying state. The expedition, when Captain Page left it in command of his son, was in about 23° 35′ S. lat. There is no reason to suppose that its members were in any great distress. They had to trust to their guns for food, it is true, but, had they been in great straits, they would no doubt have returned with Captain Page. The death of the leader was not immediately due to hardships, but to an illness which had already shown itself when he started. Provisions were sent to the party on August 13th by land, and it is quite possible that the *Bolivia* may yet return to the Patina swamp, and that the question of the Pilcomayo navigation may be finally settled. Mr. Graham Kerr, a well-known and distinguished student of Edinburgh University, in a letter sent by Prof. Bayley Balfour to *Nature*, gives no very glowing account of the river and its surroundings. At the mouth it is only 50 yards wide, and in lat. 24° 25′ S. and long. 58° 40′ W., from which point Mr. Kerr despatched his letter, it is barely 20 yards across, and has scarcely any water. The country is disappointing as regards its botany, zoology, etc., and the scenery, though sometimes beautiful, is more frequently monotonous. Birds are the only form of life which present any variety. Mr. Kerr had observed 116 species, of which about 30 had not been collected in Argentina before. The cold in the mornings was intense, whilst another inconvenience from which the explorers suffered was the saltness of the river water.

**Canada: Unexplored Regions.**—The *Bulletin of the American Geog. Soc.*, June 30th, 1890, contains a summary of a paper read by Dr. G. Dawson before the Ottawa Field Naturalists' Club. The districts alluded to have an aggregate area of nearly 1,000,000 square miles, and many of them lie to the north of the limit of profitable agriculture. This limit is, according to Dr. Dawson, the isothermal line of 60° Fahr. in the month of July. From the south of Newfoundland it passes to the north end of Lake Mistassini, touching the southern shore of Anticosti, and then runs across Hudson Bay to a point a little to the north of York Factory. Thence it turns westwards past the north end of Reindeer Lake, and runs in a north-westerly direction across Great Slave Lake to the southern shore of Great Bear Lake, where it takes a westerly direction again, striking the Yukon River considerably to the north of the confluence of the Pelly and Lewis. The following are the tracts which await the explorer: the country between Alaska, the Porcupine River, and the Arctic Ocean, 9500 sq. miles; between the Lewis and Yukon rivers and Alaska, 32,000 sq. miles; between the above rivers, the Stickeen, and the coast ranges, 27,000 sq. miles; the territory between the Pelly and Mackenzie rivers, 100,000 sq. miles; between the Great Bear Lake and the Arctic Ocean, 50,000 sq. miles; between the Great Bear and Great Slave lakes and the Mackenzie river, 35,000 sq. miles; a tract of 81,000 sq. miles, bounded by the rivers

Stickeen and Liard on the north and the Skena and Peace on the south ; 75,000 sq. miles between the Peace, Athabasca, and Loon rivers ; 35,000 sq. miles to the south of Athabasca Lake ; an area of 7500 sq. miles between Bathurst Inlet and the Coppermine River ; a territory of 31,000 sq. miles between Black River and the Arctic Ocean. There is also a vast region, with an area of 178,000 sq. miles, between the lakes already mentioned and the western shore of Hudson Bay ; an extent of 22,000 sq. miles between Hudson Bay and the rivers Severn and Attawapishkat ; an area of 15,000 sq. miles between lakes Trout and Seul and the Albany River ; and about 35,000 sq. miles south and east of James Bay. Finally, almost the whole of the interior of Labrador, estimated at 289,000 sq. miles, is unexplored country.

**Greenland.**—Lieutenant Ryder has given, in *Petermann's Mitt.*, Bd. 36, No. viii., details of the plan he intends to follow when he leads the Danish Expedition to Greenland, as announced in the *Scottish Geographical Magazine*, vol. vi., p. 270. The coast to be explored may be divided into two stretches. The first extends from Franz Josef Fiord to Cape Brewster, lat. 70° north. Scoresby drew a map of this coast in 1822, but, the main object of his voyage being to hunt whales, he could only land twice or thrice, and did not explore the inlets which penetrate far into the land between Franz Josef Fiord and Scoresby Sound. From Cape Brewster to Angmagsalik the coast is hardly known at all : it was sighted by Scoresby in 1822, and by the French naval officer, Jules de Blosseville, in 1833. Captain Holm drafted a map of it from sketches and information supplied by the Eskimo, from which it appears that the inland ice approaches very close to the coast, and, for a considerable distance, descends into the sea. The expedition is to consist of nine persons : two naval officers, a scientist, four sailors, and, probably, two Greenlanders from the Danish colonies on the West Coast. They will be furnished with three boats, each 22 feet long by 6 broad, a house, sleighs, tents, fire-arms, etc. They will leave Copenhagen at the beginning of June 1891, and endeavour to form a depôt of provisions at about 69° north lat. The ship will then sail to Cape Stewart, the south-eastern extremity of Jameson Land, which, being low and slightly undulating, is well suited for winter-quarters, besides having atttactions for the mineralogist and affording opportunities to the sportsman of obtaining abundance of fresh meat. When their equipment has been landed, most of the members of the expedition will go on board again and spend the remainder of the Arctic summer in exploring the fiords between Scoresby Sound and Franz Josef Fiord, after which the vessel will return home to Denmark. During the winter scientific observations of all kinds will be taken, and, as soon as the young ice is strong enough, short journeys will be made in sleighs around the neighbouring country. In the spring longer excursions will be made up Scoresby Sound and to the inland ice. Where possible, the velocity of the glaciers will be measured, and other observations taken which may have a bearing on the numerous questions relating to the inland ice and glacial phenomena in general. At the end of June, having left the collections they may have made to be brought away by the ship, the explorers will take to the boats and follow the coast southwards. The steamer, after taking on board the collections at Cape Stewart, will make hydrographical observations to the north of Iceland and in Denmark Strait, until the time has arrived to seek the expedition at Angmagsalik. According to Captain Holm and the statements of the Eskimo, the heavy masses of the Polar ice lie, during the end of autumn, at some distance from the coast, and therefore September has been fixed as the month in which the expedition is to be taken on board. Should, however, the vessel be unable to reach the coast, or the expedition arrive too late in the

season, the explorers will have to winter at Angmagsalik, and, in the summer of 1893, make their way by boat to the Danish colonies on the West Coast, whence they can take a passage home in the ships of the Königl.-grönländischen Handel. A sum of 180,000 kroner (about £10,000) has been voted by the Danish Government for the equipment of the expedition.

## COMMERCIAL GEOGRAPHY.

**The Mining Laws of Austria and Hungary.**—The mineral wealth of Hungary has long remained in an undeveloped state, partly from want of enterprise, but, in later times, from the avarice of the landed proprietors who have, almost uniformly, demanded prohibitive rates for concessions. Legislative action is now about to be taken to encourage the search for, and working of, coal and petroleum. Minerals in Hungary, as in most other countries, belong to the owner of the land under which they are found, and it is intended to abolish this usage, in so far as coal and petroleum are concerned, and bring the Austrian system forward in its place. In Austria the possessor of a mineral licence may prospect for, and work, any mineral wherever he may think the prospects are favourable, quite independent of leave from the proprietor of the land, who, however, must be indemnified for surface and other damage. Should too great a sum be asked for such damages, the miner can procure a compulsory lease at a fair rent, or the land needed may be acquired by him at a moderate price, royalties being unknown. The Hungarian Government, however, desires to retain royalties, but in all other respects they propose to follow the rules in force in Austria, which have done much to encourage the mining industry of the country.

**Smyrna.**—The British Consul-General at Smyrna states in his last report that that town is the emporium for the whole of Asia Minor lying on the Mediterranean and for the interior to a distance of some 300 miles from the city, its connections reaching even into parts of Angora and Adana. Its importance as a trade-centre is yearly increasing, owing in great measure to the extension of the railways, which have been constructed with British capital, and are under British management. The port is one of the finest and safest in the Mediterranean, and the harbour might be indefinitely extended, but care must be taken that the approaches to it do not become silted up. The total value of the merchandise exported from Smyrna last year was £4,535,975, and the value of the imports was £3,236,139. Of these figures a very large proportion represents the trade with Great Britain, namely, imports, £1,255,062; and exports, £2,092,475.—*The Times*, August 27th, 1890.

**The Railways of Ceylon.**—The receipts of the Ceylon railways have been steadily growing since 1883, and that in directions which point to returning prosperity to the planters. Last year the profits were 11 per cent. on the subscribed capital, and the working expenses 47 per cent. on the earnings. The following increases took place in the weight of goods carried—tea, 3414 tons; tea leaf, 478 tons; coffee, 210 tons; cotton, 258 tons; coconuts, 207 tons; plumbago, 776 tons; copra, 176 tons; poonac, 179 tons. Against these advances the following articles showed a decrease—rice, 2517 tons; chinchona, 144 tons; cocoa, 115 tons; salt, 114 tons. These figures show a net increase of 2808 tons, and, besides, indicate in a very interesting manner which of the many new crops lately tried by the planters are in demand and likely to succeed. During the same period the number of passengers carried, exclusive of season ticket-holders, was 2,285,208, or an increase over the previous year of 102,910. The total length of railways in the island is

180½ miles, and extensions, both among the mountains and along the coast, are being pushed on.

**Manchuria.**—A report has lately been issued by the Chinese Commissioner of Customs at Newchwang, in which some interesting particulars are given regarding the means of transport existing in Manchuria. The roads are mere tracks of frozen mud, impassable in wet weather. The late harvest has been exceedingly abundant, and peas, beans, and oil have come pouring into Newchwang, as many as 2000 carts arriving daily when the tracks were hard frozen, and about 1000 per day when the roads were in a less favourable state for traffic. The smaller carts are drawn by a cow with a couple of donkeys in the traces, and carry a load of 16 piculs (a little over 113 lbs.). Medium-sized carts are drawn by five animals, and can make a journey of four or five days with a load of 33 piculs. The largest carts are dragged along by a small horse in the shafts, with six mules, three abreast, and can make a 20 days' journey. They are mostly used for the transport of beans. The oil carts are drawn by mules only, under the care of a couple of drivers, one walking beside the team, while the other, sitting on the top of the load, wields the whip. These teams generally make a journey of 30 or 40 consecutive days, the animals resting all night in the inn yards, without shelter or clothing, under a semi-Arctic climate. The Commissioner confidently expects that railways constructed to Newchwang will have their usual marked effect on trade. Newchwang is situated near the Yellow Sea, and is the most northerly port of China open to foreign trade.

**A Ship Railway in Canada.**—It is proposed to connect Lake Huron with Lake Ontario by a ship railway starting from Toronto, whereby about 400 miles of lake navigation and 28 of canal would be saved in the voyage from the head of the lake to Montreal. Its length would be 69 miles, and it would consist of three tracks of the usual 4 ft. 8½ in. gauge. The highest point to be surmounted is 664 feet above Lake Ontario, and the steepest gradient, on the southern slope, would be 1 in 176, and on the northern 1 in 264. It is estimated that on this line three locomotives will be able to draw a vessel of 2000 tons (cargo included) at the rate of ten miles an hour. The total cost is put at 12,000,000 dollars, or half the cost of a canal of the same capacity.—*The Times*, Sept. 17th, 1890.

## MISCELLANEOUS.

**M. Bonvalot and Prince Henri d'Orléans** have traversed Tibet, and have reached Chung-king.— *Revue Française et Exploration*, Aug. 1st, 1890.

The Stockholm Academy of Sciences has resolved to send an **Expedition to Cameroons** under the command of Ingve Sjoestedt. Its principal object will be the investigation of the fauna, particularly the entomology, of the western mountains.

The spring of 1892 has been fixed as the time when **Nansen's Expedition** is to set out. Captain Sverdrup is to hold the nautical command, and the crew is to be composed entirely of Norwegians; but foreigners will be received on the scientific staff.—*Globus*, Bd. lviii., No. 9.

Besides the Caucasus railway through the Liakhva valley and over the Roki Pass into the Ardon valley, another **railway** is projected, from **Dushet** up the Aragua valley and across the main chain to the west of Tebulos Mta into the Ardon valley.—*Globus*, Bd. lviii., No. 5.

*Globus*, Bd. lviii., No. 5, gives the **Foreign Trade of Russia** during the year 1889 as amounting in value to £106,076,600. Of this sum £68,708,500 represents the exports, and £37,368,100 the imports. The trade with Great Britain amounted to 34 per cent. of the total. Germany has also a large share.

A special commission is to be formed for the physical, biological, and geographical **Investigation of the Black Sea**, under the control of the Russian Hydrographic Office. A subsidy of £5000 a year for three years will be devoted to the purpose.—*Revue Française et Exploration*, Aug. 1st, 1890.

M. Yadrintzef has been commissioned by the Russian Geographical Society to undertake an **Archæological Exploration in Mongolia**, with the object of fixing the site of Karakorum, the ancient capital of the Khans of Mongolia. It is supposed to lie somewhere to the south of Lake Baikal.—*Compte Rendu* of the Paris Geog. Soc., No. 10, 1890.

The **Coal Fields of Natal** have of late increased their output in a remarkable degree. Not long ago South Africa had to import all the coal required, but now an export trade has been begun after all local demands have been met. The railways expect to make an annual saving of £50,000 by the consumption of fuel locally procured.

*The Canadian Gazette*, Aug. 7th, 1890, states that **Sable Island is disappearing**. This island, which lies in lat. 44° N. and long. 60° W., was, not very long ago, 40 miles long, whereas it is now only 20 miles. Since 1880 three lighthouses have been built on it, of which two have been washed away, and the third is being rapidly undermined by the waves.

The excavation of a **Port in the lake El Bahira, at Tunis**, is making rapid progress (*L'Afrique*, Aug. 1890). The great dredge has, during the last twelve months, cut a channel from Goletta towards Tunis, 81 feet broad and 11½ feet deep. It will soon reach Tunis. In one month it has removed the enormous quantity of 75,864 cubic yards of excavated earth.

In spite of the heavy poll-tax which **Chinamen** have to pay on entering the **Australian Colonies**, their number has increased during the last ten years. The number now settled in Australia itself is 41,848, being an accession of 3990 since 1881. In Tasmania and New Zealand there are 47,433, an increase of 3727 during the same period.—*Globus*, Bd. lviii., No. 9.

The Official Customs' returns for the past year's **Trade of Bangkok**, the capital of Siam, show imports valued at $9,559,541, and exports at $13,717,676, a decrease compared to the values for the previous year of nearly $4,000,000. The falling off was due almost entirely to the single item of specie. Rice and teak form the chief exports, and the values of these, according to the returns, were $8,594,987 and $1,236,637, respectively.

A small steamer, the *Yunnan*, has ascended the **Red River of Tonkin** from Hanoï to Laokaï, a distance of over 180 miles, in sixty hours, and descended in sixteen hours, thus proving that the river can be navigated during the season of high water. The *Revue Française et Exploration* also reports that the first caravan of French goods reached Luang-Prabang on May 3d. From Luang-Prabang to Hanoï is twenty-five days' march, and the return journey occupies thirty-two days.

**The Warmest Place in Europe** is Malaga. The *Verhandlungen der Gesell. für Erdkunde zu Berlin*, quoting from the *Meteor. Zeitschrift*, says that it is warmer even than the Algerian coast. The mean of the daily maxima is 66°·4 Fahr., and the month of August enjoys the Tropical temperature of 80°·8, while the absolute maximum reaches 110°, and the minimum, in the exceptionally cold year of 1885, was 32°. There are only forty-eight rainy days in the year. The sugar-cane and the *cherimoya* grow in the neighbourhood.

The preparations for the **Antarctic Expedition**, announced in the *Scot. Geog. Mag.*, vol. vi. p. 216, are now being definitely arranged. At a meeting of the Royal Geographical Society of Australasia (Victoria Branch), held at Melbourne on August 22d, it was stated that Baron Oscar Dickson had offered to contribute £5000 towards the expenses of the expedition, if the Australian colonies would furnish an equal sum, and that he would make good any further deficiency. The Council of the Society has voted £200 to the funds, and other subscriptions are promised. Professor Nordenskiöld will draw up a scheme for the guidance of the expedition, and will probably appoint a leader from among his old colleagues. Next autumn is the time proposed for the departure of the expedition.

The Royal Colonial Institute has acquired the original **Drawings and Water-Colour Sketches** made by the late William Westall, A.R.A., the artist who accompanied Captain Flinders on his Australian voyage in the years 1801, 1802, and 1803. The collection is entire, Westall having stipulated for the return of his illustrations after they had been used by the Admiralty; and ever since they have remained in the custody of his family. Many of the drawings show signs of submersion, as they were on board the *Porpoise* when she was wrecked on Wreck Reef, and some of them also were damaged by a flock of sheep which Sir John Franklin (then a midshipman accompanying the expedition) drove over them as they were lying out to dry. Nevertheless the collection, comprising 134 pieces, is of great interest.

## NEW BOOKS.

*Scottish National Memorials: a Record of the Historical and Archæological Collections in the Bishop's Castle, Glasgow*, 1888. Edited by James Paton. Glasgow: James MacLehose and Sons, 1890.

This sumptuous volume, dedicated by permission to Her Majesty the Queen, is, as the preface informs us, "the outgrowth of the interest excited by the Historical and Archæological Collection which was brought together in the 'Bishop's Palace'—a reproduction of the ancient Castle of Glasgow, designed by the late Mr. James Sellars for the Glasgow International Exhibition of 1888. That collection of Scottish National Memorials was the largest and most important that had ever been brought together, and it was felt to be worthy of a more permanent record than could be given by any official catalogue. It was therefore determined to prepare a volume which should not only be an illustrated memorial, but a national contribution to the history of Scottish antiquities and a vivid picture of Scottish life."

The editing of the work was entrusted to Mr. James Paton, Curator of the Kelvingrove Museum and Glasgow Corporation Art Galleries, by whose exertions the collection in the Bishop's Palace had for the most part been got together and arranged. Among those who assisted Mr. Paton in the preparation of this work, we may mention Sir Arthur Mitchell, Dr. Joseph Anderson, and Mr. John Gray, of the National Portrait Gallery. The volume is profusely illustrated and handsomely bound. Editor, contributors, printers and engravers have all done their shares in the work in a thoroughly satisfactory manner, and the result is a most valuable addition to the historical and archæological literature of Scotland.

The value of such a work necessarily depends, to a very great extent, on method and arrangement—a matter to which the editor has evidently paid much attention. The proper classification of such a large and varied collection as that which forms

the subject of the work is no easy task, especially as several different bases of classification might have been adopted. The following are the principal headings under which the objects are grouped, and probably no better system of arrangement could have been chosen :—

(1) Scottish Archæology, subdivided into Prehistoric, Roman, Early Christian, and Mediæval Remains.
(2) Historical and Personal Relics ; subdivided into Early Scottish, Memorials of Queen Mary, Scotland after the Union of the Crowns, the Jacobite Period, Medals relating to the Royal House of Stewart, Miniatures, Seals, Tassie Medallions.
(3) Scottish Literature ; subdivided into Bibles, Psalm Books, Prayer Books, The Glasgow Press, Robert Burns, Sir Walter Scott, and Miscellaneous.
(4) Burghal Memorials ; subdivided into Aberdeen, Dumfries, Dundee, Edinburgh, Glasgow, Irvine, Linlithgow, Perth, St. Andrews, Stirling, Scots Masonic Relics, and Beggars' Badges.
(5) Scottish Life ; subdivided into Military, Industrial, Domestic, Torture and Punishment, Charms and Amulets, and Communion Tokens.

There are no less than thirty full-page folio plates and 287 illustrations in the text. Last, but not least, there is an excellent general index and also a list of contributors to the collection.

*The Life and Letters of Adam Sedgwick.* By J. W. Clark, M.A., F.S.A., and T. M'Kenny Hughes, M.A., F.R.S. 2 vols. 8vo, pp. 539, 640. Cambridge : University Press.

The famous Woodwardian Professor of Geology died in 1873, so that if the present biography were not an excellent one want of time for its preparation could hardly be pleaded. Soon after Sedgwick's death Professor Hughes, his successor in the Woodwardian Chair at Cambridge, agreed to tell the story of his life and labours, but twelve years had slipped away before Mr. Hughes realised that the increasing duties of his professorship would prevent the accomplishment of the task he had undertaken. The delay is to be regretted, but it is fortunate that the preparation of the biography should eventually have fallen into the hands of so competent a scholar as Mr. Clark. The geological portion of the work has been contributed by Professor Hughes, and Sedgwick being known to fame chiefly as the most prominent geologist of his time, one might suppose that the bulk of these volumes would be occupied with the story of his geological labours. But, as every Cambridge man knows, Sedgwick was actively interested in all the movements that stirred the great University during his long residence of seventy years, and the larger portion of this work, therefore, is taken up with an account of the social and intellectual life of the circle in which Sedgwick moved. Thus it is not geologists only, or chiefly, who will welcome this biography, but all who wish to know much of the inner life of Cambridge from the beginning of the century down almost to our own days. Sedgwick was born in Dent, Yorkshire, in 1785 ; commenced residence at Trinity College in 1804 ; graduated in 1805 ; obtained a fellowship in 1810, and took orders in 1816. He does not seem, however, to have had any special predilection for a clerical life, but simply to have made up his mind to permanent residence at Cambridge. In those days, however, residence was by no means very desirable. Sedgwick confessed to a friend that he was on the whole rather disappointed in the society of Masters of Arts. "Many are gloomy and discontented, many impertinent and pedantic ; and a still greater number are so eaten up with vanity that they are continually attempting some

part which they cannot support." Before long, however, the old order changed, and the history of these changes forms not the least interesting portion of this biography. Sedgwick's earlier years at Cambridge do not appear to have quite satisfied himself—grinding with pupils was not to his taste—literary work bored and irritated him—he would much rather have been up and doing. An open-air life is what would have suited him; and hence, when the Woodwardian Chair became vacant in 1818, we are not surprised that he should have become a candidate. In such a position he could gratify his tastes for active exercise afield, and could escape the pupil-grinding which he did not like. It is true he did not know anything of geology when he made his application for the post; but the fact is there was little of geology at that time to be gathered from books, while none of the former occupants of the chair could properly be styled a geologist. Indeed, only one of them, the Rev. J. Michell, seems to have had any knowledge of earth-lore. The chair, instituted in 1731, had been occupied successively by six professors, not one of whom seems to have given a regular course of lectures! Sedgwick was appointed, and straightway entered upon the duties of his chair with characteristic energy. If he had all his subject to "get up" the labour was of a kind after his own heart, and he soon made remarkable progress. In a few years, indeed, he had gained for himself the foremost place amongst British geologists. No one has ever excelled him in the ease with which he could unravel the geological structure of a country. He knew what to look for and where to find it better than any of his compeers. His enthusiasm awoke in the minds of his students a corresponding desire for knowledge, and no lecturer in Cambridge was ever listened to with more attention. His influence, however, was felt far beyond the precincts of his lecture-room. His many wanderings brought him into association with all kinds of people, to whom he delighted to impart from the stores of his knowledge. He was, it is needless to say, a constant visitor at the meetings of the Geological Society in London, of which, indeed, he was for a time the life and soul; while for many years he shone as one of the bright particular stars whose brilliance drew wondering "provincials" to the meetings of the British Association. Sedgwick's chief geological work was accomplished among what are now known as the older Palæozoic rocks. Before his day nothing, or next to nothing, was known of the order of succession of these rocks, but he succeeded in unravelling that structure, and in establishing the Cambrian System. Unfortunately he came to loggerheads with Murchison, who, in founding his "Silurian System," included in that system certain strata which Sedgwick claimed as Cambrian. Those who side with the latter would abolish Murchison's "Lower Silurian," and incorporate it with the underlying Cambrian as the upper member of that system; while other geologists would erect it into a separate system (Ordovician) inserted between the Cambrian and the Silurian. Sedgwick's biographers devote many pages to the discussion of this question, which, from their point of view, is natural enough. They seem, however, to make too much of it. It is certain that geologists will not now consent to the inclusion of the "Lower Silurian" in the Cambrian. It is very doubtful indeed if they will even agree to call the strata in question by any other name than "Lower Silurian"—for the suggested "Ordovician" has found little favour. But Sedgwick's fame will not be affected by the mere drawing of a boundary line between two geological systems. He will always be remembered by geologists as one of their *dii majores*.

Sedgwick's printed works consist principally of geological papers and monographs, which would have been even more numerous and more elaborate if only he could have conquered his dislike to literary labour. Thus he did himself injustice, and it can hardly be doubted that had he promptly published the results of his

field work, instead of allowing the material to lie aside for years, the unpleasant controversy with Murchison would never have taken place. His monographs are of very unequal value, both from a literary and geological point of view. When the writer is at his best his style is admirable—clear and vigorous. It gives one the impression of a powerful or even masterful mind, but withal straightforward and truth-loving. His letters are often charming—especially those to ladies and children, which are full of fun and playfulness. Those who knew him well loved him dearly, but he was a favourite everywhere with everybody. A large-hearted man, carrying his erudition lightly, and anything but a pedant,—possessed of abundant animal spirits, and with a quick eye for the humorous side of things—he could not fail to make his way with young and old. He was, in short, one of the most interesting men of his day; and the present biography will enable those of the younger generation to understand how it was that he came to have such an influence. The work, as we have indicated, is excellently done. If we have any complaint to make it is that the book is just too big. The long account of Dr. Woodward and his "foundation" might have been relegated to the appendix, and the account of Sedgwick's geological labours is rather heavily written, and might have been shortened with advantage. The non-geological reader cannot appreciate all the detail, and the geologist does not need it. We are, however, grateful to the authors who have given us so complete and adequate a life of Adam Sedgwick.

*Across the Border; or, Pathan and Biloch.* By Edward E. Oliver, M.Inst.C.E., M.R.A.S., etc. London: Chapman and Hall, 1890.

The author informs us in the first chapter of the book that much of the information has already appeared in two Indian papers—*The Civil and Military Gazette* and *The Pioneer*. Those interested in Indian subjects will be grateful for what we might call this encyclopædia of the Punjab frontier tribes, who inhabit a broad belt of country nearly 500 miles long, extending from Kashmir to Sind.

The diversity of these peoples is remarkable. Many of the tribes or clans, though within touch of each other, differ in personal appearance and character and, in some cases, in their language and customs. One trait they all seem to have in common is a hatred of their neighbours—tribe against tribe, clan against clan, village against village, and, often in the same hamlet, family against family.

The blood feuds that run on for generations seem almost incredible, and many of the illustrations of these feuds given by Mr. Oliver are very amusing, combining as they do both the tragic and the comic element.

Some of the best soldiers in our Punjab frontier force come from these wild tribes, and the Queen's Own Corps of Guides—a splendid body of infantry and cavalry—contains many picked men from across the frontier, familiar with most of the country lying between the Indus and Kabul, and belonging to tribes against whom we have had expeditions, and may have again. Mr. Oliver tells us this system of enlisting men from across the border has been found to work admirably. These men will march anywhere, fight any one against whom they are led; and when one of these soldiers returns to his home he carries with him a good feeling towards the Government, whose power and resources he has come to know, and thus exercises an excellent influence in its favour among his own people. Over and over again these men have marched against their own homes. On one occasion a native officer, whose father was seen on the hill about to be attacked, urged his commanding officer to get blood spilt between the troops and the Ghazis before nightfall, so as to stop any feeling of sympathy that might arise.

Not the least interesting part of the book is the elaborate map of the countries lying between Karachi and the Oxus, and between Kandahar and Lahore, giving the territorial boundaries of about sixty of the frontier tribes, and showing the mountains, passes, heights, and rivers, the existing and proposed railways, the frontier military roads, completed and in progress; and, in short, giving a very fair idea of the first line of defence of our Indian Empire.

*Rulers of India—Akbar.* By Colonel G. B. Malleson, C.S.I.

In the long roll of Indian rulers there is no greater name than that of Akbar, and no one who, the better he is known, both as man and as ruler, excites a deeper admiration. It is a very interesting question how, with his antecedents of race and education, he came to be a liberal-minded ruler, with enlarged views of administration and great capacity for organisation, of a tolerant and open-minded spirit in an age of intolerance, and thoroughly penetrated with a sense of his duty to all classes of his subjects. The task of tracing the development of the man and the gradual expansion and elevation of his aims, and of describing and fairly estimating the measures he adopted to give effect to his views, is one that requires insight into character, thorough mastery of the original authorities, and a clear perception of what he owed to others as well as of what he originated himself.

Colonel Malleson has told the story of Akbar's life in his usual easy and agreeable style, and he has described Akbar's aims and the measures he adopted to accomplish them in such a way as to bring out clearly the nobility of his character and his significance, as not merely a victorious aspirant to power, but the organiser of an empire on a durable and equitable basis. But his work is hardly the exhaustive critical study we expect from a specialist in such a series. Instead of a calmly impartial estimate we have rather a glowing panegyric, with not a few of the shadows left out, and rather minimising his debt to others, while the attempt made to trace the development of the man is far from adequate. Colonel Malleson has read up his authorities, but he has not made the period his own, as he has mastered that of the struggle between the French and English adventurers in India. Nor does he seem to have clearly decided what class of readers he should keep in view. He has devoted sixty-four pages to the history of Babar and Humayun, which, except for those quite ignorant of the general history, might have been told in a more compressed form, as far as it affects the character and life of Akbar, and so left more room for details illustrating his proper subject, while in this preliminary sketch there are traces of hasty generalisation and an occasional want of precision in his statements, which may prove misleading to the uninformed reader. Thus, on page 26, he makes the rather hazardous statement, that in pre-Mohammedan times "the wars periodically occurring between the several kings of the several provinces or divisions were mostly religious wars." Again (page 13), he says of Taimur that "he conquered India," and that "he left behind him one of the greatest empires the world has ever seen," the exaggeration in which statement is manifest to any one who knows the details of his devastating expeditions.

Still, though this life tells little more than is to be found in the accessible pages of Elphinstone's history, it must be said that no reader of the sympathetic narrative can fail to be impressed with the significance of Akbar's career and with the true greatness of his character.

The transliteration of proper names is on the whole creditably accurate, but one is rather surprised to find the well-known Fort Chunár invariably appear as the hardly recognisable Chanar.

*Advanced Physiography* (Physiographic Astronomy) : Designed to meet the requirements of Students preparing for the Elementary and Advanced Stages of Physiography in the Science and Art Department Examinations, and as an Introduction to Physical Astronomy. By JOHN MILLS. London : Chapman and Hall, 1890. Pp. 287.

This volume only covers part of the ground laid out in the "Syllabus of Advanced Physiography" of the Science and Art Department, and it covers that part inadequately. Such statements as "cyclones and anti-cyclones come under the general head of storms, which may be defined as very sudden and violent winds," and "Lake Albert Nyanza is on the Equator," are characteristic of the vagueness and inaccuracy of the compilation.

*Moffatt's New Geography, written for the Present Time.* Being a Manual of Geography—Astronomical, Physical, Commercial, and Political. Edited by THOMAS PAGE, and revised by Rev. E. HAMMONDS, M.A. London : Moffatt and Paige. Pp. 428. *Price* 4*s.* 6*d.*

The "aim of the author" is described in the preface, but the name of the author is only obscurely hinted at on the title-page, if indeed the name "Moffatt's" apply to the author and not to the publisher. The united efforts of author, editor, and reviser have produced a very comprehensive work, concisely expressed, and accurate so far as we have tested it. There is a complete index and an appendix containing specimens of examination papers. Long lists of names recall the geographies of a past time, but the general matter and most of the notes descriptive of places are written in the more attractive style of the present. There are no maps, as the author rightly considers an atlas indispensable ; but we feel inclined to think that the combination of an atlas and text-book is no graver fault than the attempt to incorporate in a small work the unteachable statistics proper to a gazetteer with a statement of geographical principles and a general survey of the inhabited globe.

*Switzerland.* By Mrs. LINA HUGG and RICHARD STEAD. "Story of the Nations" Series. London : T. Fisher Unwin, 1890. Pp. xxiv. and 430. *Price* 5*s.*

The story of the Swiss nation has naturally a strong fascination for the people of these islands, and this most interesting volume ought to be both welcome and popular. The rise of the Swiss to the position, one might almost say, of a power—the welding together of all the various peoples and sects who, united, made themselves feared by their enemies and respected by all who sympathised with their love of freedom—is here told with great freshness, and often in considerable detail, although the temptation to become diffuse has been carefully avoided by the authors. No one part has had too much attention devoted to it, and nothing that deserves notice in a popular history has been left out : with the result that we have a model volume of the series. It is impossible in a short review to note many points that we should like to draw attention to, but we may mention the chapters on the early lake-dwellers, on the Helvetians, and on Zürich, as favourably showing, in small compass, the plan and scope of the whole work and the manner in which it has been carried out. The page illustrations are all good, many of them beautiful ; but we cannot say as much for the small cuts inserted in the text ; and the map is rough. The index, as in all the volumes of the series which we have examined, is ample and clear, and no difficulty need be experienced in immediately finding any subject that may be sought for. Altogether, the book is a capital one, and is heartily welcome.

*The "J. E. M." Guide to Davos Platz.* Edited by J. E. Muddock, F.R.G.S. London: Simpkin, Marshall and Co., 1890. *Price* 2*s.* 6*d.*

This is a fourth edition of a handbook that should serve the purpose it has in view. It gives a great deal of practical and useful information that is not usually found in books of its kind, if also a certain amount that might have been omitted with advantage.

*Illustrirter Führer durch die Dolomiten.* Von Julius Meurer. Wien, Pest, Leipzig: Hartleben, 1890. *Price* fl. 3.

The plan of this guide is a good one, though it involves a certain amount of repetition. Apparently based upon Baedeker's system, it is differentiated by a more precise examination of routes from a given centre. For route-marching it is admirably adapted, but, owing to the brevity of its descriptions, it might in places fail to interest the average tourist.

Having recently travelled through a portion of the region described, we are able to state that the guide may be so far regarded as accurate and up to date; but we do not agree with all the recommendations in regard to the relative comfort of the hotels.

The maps are unworthy of a German or Austrian publication, and the illustrations are poor.

*The "J. E. M." Guide to Switzerland.* Edited by J. E. Muddock, F.R.G.S. London: Simpkin, Marshall and Co., 1890. *Price* 4*s.* 6*d.*

The construction of this guide, differing from others, has its merits. The introductory articles deserve special commendation. The manner of describing routes is clear. The price of the book is low, although it is well got up. The present edition is issued without the map of Switzerland, which should have accompanied it. There are numerous misprints.

*Camping Voyages on German Rivers.* By Arthur A. MacDonell, M.A. London: Edward Stanford, 1890. Pp. xvi. and 268.

This is, in reality, a guide-book in narrative form, and a very useful and complete *vade mecum* it will prove to those who may feel inclined to follow the example of Mr. MacDonell and his friends in their boating voyages on the German rivers. The narrative is, as a rule, devoid of exciting incident, and, like many of the streams it describes, flows on smoothly enough—at times monotonously. But it forms pleasant reading, and the information given is exactly what the voyager requires, much of it, indeed, being indispensable to the novice if a quiet undisturbed boating holiday is the object in view. The maps are plentiful, and, although small (with the exception of the index map at the end), are distinct and well arranged. The appendix, consisting of tables of approximate distances, is also an excellent feature. The index is most minute. Altogether, it is evident that the volume has been written with a view rather to utility than to effect, and on that account will be all the more welcome to those to whom it more immediately appeals.

*Scenes and Stories of the North of Scotland.* By James Sinclair. Edinburgh: James Thin. 1890. Pp. vi. and 242.

Both in plan and title Mr. Sinclair's volume, rather unfortunately for itself, cannot fail to provoke comparison with Hugh Miller's *Scenes and Legends.* The

author's work is of very unequal value; part of it is good, but most of the pages bear traces of haste and carelessness. Prejudice of race also is shown, and, in one case, is carried so far as to be ridiculous—to those, at any rate, who are acquainted with the history of the northern counties.

Nevertheless, there is much to praise and admire in these *Scenes and Stories*. The author is at his best when he confines himself to fact, description, and anecdote, and his work is then superior to what is usually found in books treating of local customs, scenery, and legends. The topographical matter ought to be generally welcome, and the stories, of which the concluding pages are so full, will afford amusement and excite laughter. In describing Caithness "characters" Mr. Sinclair has opened up quite a new vein, which might be still further worked with profit and amusement.

*Sketch-Book of the North.* By George Eyre-Todd. Glasgow: William Hodge and Co., 1890. Pp. 212. *Price* 1*s.*

These sketches have already appeared in magazines and other periodicals, and, although without direct geographical value, give pleasant descriptions of places and scenery in the Highlands, with here and there some slight attempt at character-drawing. The book may be recommended as a desirable companion to all the localities it describes, and by those who already know these places it will be read with interest.

*Newfoundland Loyal to its Mother England; and its Position and Resources.* By Augustus G. Bayly. London: Gilbert and Rivington (Limited), 1890. Pp. 30. *Price* 6*d.*

This little pamphlet comes before the public at an opportune time. The author has that to tell which may surprise many readers and show them that the country he pleads for is by no means a useless portion of the Empire, and that its interests and development merit some care at our hands.

*Maps and Map-Drawing.* By William A. Elderton. Macmillan's Geographical Series. London: Macmillan and Co. 1890. Pp. 129. *Price* 1*s.*

Books of this kind are very difficult to write. To treat of any subject within the compass of a small octavo volume of 129 pages demands great judgment in the selection of the most important points and clearness in their explanation. In this book the author has included more than the title seems to demand, having given a description of some of the instruments used in surveying and of the processes of triangulation, finding the latitude and longitude, etc., and has thus increased the difficulties of his task. Certainly the pages taken up with the history of maps and globes, and the description of the manufacture of the latter, might, in such a work, have been profitably devoted to a more detailed discussion of other parts of the subject. However, considering the wide range he has chosen, the author has perhaps acquitted himself as well as could be expected. The plane table is so valuable an instrument that it deserves a fuller description, and the sole advantage of the Gnomonic projection, namely, its usefulness in Great Circle sailing, might have been pointed out in a word or two. Ascertaining heights by the boiling-point is a method which has not been discarded since the invention of the aneroid, as seems to be implied on p. 48, the aneroid being unreliable. Lastly, we should prefer the Sanson-Flamsteed to the conical projection for countries on the Equator, such as Ecuador. The chapter on map-drawing from memory contains some useful hints.

POLITICAL MAP
OF
AFRICA
1890
THE BRITISH ISLES
MOROCCO
ALGERIA
TUNIS
EGYPT
ABYSSINIA
FRENCH CONGO
CONGO STATE
BRITISH EAST AFRICA
GERMAN EAST AFRICA
PORTUGUESE
TRANSVAAL
ORANGE FREE STATE
INDIAN OCEAN
AFRICA
Reference to Colouring of
SPHERES OF INFLUENCE
IN ACCORDANCE WITH TREATIES

# THE SCOTTISH GEOGRAPHICAL MAGAZINE.

## A RAILWAY THROUGH SOUTHERN PERSIA.

*(Read at Meeting of British Association, Leeds, September 1890.)*

By Major-General Sir Frederic Goldsmid, K.C.S.I., C.B.

So far back as June 1878, I accepted the invitation of the Royal United Service Institution, to read a paper on "Communications with British India under Possible Contingencies." The main object of that paper was to advocate the construction of a line of railway connecting the eastern shores of the Mediterranean with the western coast of India, by a direct, convenient, and politically expedient route—a great part of which, on the eastern side, was *terra incognita* to the many, though known to myself and some few more whose lot had been temporarily cast in that particular region. Sketching, as nearly as practicable, from study, or personal experience of the countries to be traversed, the precise course that the contemplated locomotive would take, I suggested the determination of Cyprus "as an appropriate starting-point. Its geographical position," I urged, "would make it a fitting guardian of Upper Syria, Cœlo Syria, and almost of Palestine, if the island were under enlightened Government." Three places were mentioned as coast-stations, Alexandretta, Tripoli, and Ruad. From these, it was argued, that "the possession of Cyprus would facilitate selection, . . . for with such resources as these available, we should only require on the mainland a landing-place, offices, sheds for temporary accommodation of troops, and residence for a small railway staff provided from headquarters in the island." I myself preferred "commencing work at Tripoli or Tyre; otherwise reviving the suggestions of Captain (the late Sir Richard) Burton—certainly not the least competent judge among the score and a half of competent witnesses examined by the Select Committee on the Euphrates Valley Railway."[1]

[1] See *Journal of Royal United Service Institution* (Mitchell, Charing Cross), 1878.

A leading article and several letters in the *Times*, bearing upon the views expressed in the lecture, followed its delivery, and the *Daily Telegraph* of the 25th June, reverting to the same subject, went so far as to say that the name of Cyprus, thus recently uttered, was one of which more might soon be heard "under circumstances very interesting to Englishmen." The writer proved to be a true seer, for less than three weeks after the paper had been read, the intention of H.M. Government to occupy that island was communicated to the plenipotentiaries at the Congress of Berlin, and, shortly after, its occupation by British troops became an accomplished fact. I need not, it is presumed, disclaim acquaintance with State secrets, or admission to State consultations, in questions out of my own special province. At the same time I cannot absolutely deny that there does exist in my mind some vague suspicion of having been incidentally spoken to in favour of making Cyprus a British possession, nor the possibility that I may have thence derived the notion of introducing the island into my scheme of communication with India. But I have not the shadow of an idea, who, if any one, did ever so speak to me; nor am I prepared to say that the suggestion of Cyprus as a British possession was not altogether original, and independent of all outside prompting.

Well, more than ten years have passed away, the island of Cyprus is ours; and I have seen no occasion to change my views. But there is one part of the paper read in those days to which I now venture to revert, with the object of supplying details of a very important kind in support of my original proposal. It refers to the actual direction which the through-line to India should take, when branching off from the Lower Euphrates. To solve this question the more essential data were wanting in June 1878. At that time I remarked:—

"Any line leading to Ispahan would have an immense advantage in the fact that, from that city eastward, all is plain sailing up to the mountains below Karman; whence my impression is, from more than one journey in the neighbouring districts, that there would be no great difficulties in selecting a means of passage to the Mekran coast. But Ispahan is far north; and Baghdad, Shustar, Shiraz, and Lar seem to indicate a more direct communication with Karachi, and therefore a fitter supplement to the Euphrates Valley rails. Were it not for the comparative unprofitableness of the northern shores of the Persian Gulf, I should advocate the actual coast line as others have done before me; but there is just enough indecision on the subject to render advisable a pause which might result in bringing into the system an important town such as Shiraz, and penetrating the tracts between that place and Bandar Abbas by a more direct and shorter route than that of the sea-coast."

It is, then, to the Baghdad-Bandar Abbas section of an Indo-European line of railway, that I would ask your attention for a few moments on the present occasion.

Captain Lovett-Cameron's *Our Future Highways*, Mr. Ainsworth's monograph on the Karun, and Sir Henry Layard's *Early Adventures* in Persia and Babylonia, are among the volumes which in recent years have thrown light on the westernmost of the localities concerned. But these

have been supplemented by many interesting and pertinent detached papers, read before societies or contributed to periodical literature, which, in their bearing upon the question of Land Communication between Central Persia and the sea, have served to strengthen acquaintance with the geographical details of our subject, continuously, and almost up to the present hour. Among the better-known names of such authorities may be cited those of the late Colonel Sir John Champain, Major Wells, Mr. G. S. Mackenzie, the Honourable George Curzon, General Sir Murdoch Smith, Colonel Mark Bell, and General Houtum Schindler of the service of His Majesty the Shah. Let me here add a passing word of commendation for the delightful and well-illustrated sketches entitled "La Perse, la Chaldée, et la Susiane," by Madame Jane Dieulafoy, published in the *Tour du Monde*.

Captain Cameron—though proposing to carry his railway from Tripoli to Baghdad by a different route from my own—is of opinion that Baghdad should certainly be a main station on it, and to reach it he would bridge the Tigris, an arrangement in which I would willingly concur, at the passage to that city from the opposite shore. Thence he adds, "the country is all nearly level; near Haweizeh several small bridges would be required, and one large one over the Karun." It is probable that a line including Dizful and Shustar, or even one of these places only, would be preferred; in any case the route should be continued to Shiraz *viâ* Bebehan.

The general direction of the proposed line has been roughly laid down in the map before us. I may here state, incidentally, that the breadth of Mesopotamia proper from the Euphrates to the Tigris immediately opposite Baghdad is less than 30 miles, while the breadth of the latter river, estimated on the bridge of boats by which it is spanned, is some 250 metres or about 820 feet. If it were thought practicable as well as expedient to include Shustar as one of the main stations, the course contemplated might be from Baghdad down the left bank of the Tigris to Amara, a modern Turkish military post, and thence, by a short stretch somewhat north of east, to the near neighbourhood of Shustar, so as to place that town and Dizful in easy communication with the rails. I specify this, as being, more or less, the Amara-Dizful caravan road referred to by Mr. Curzon, and traversed by Mme. Dieulafoy: otherwise it is probable that a shorter and more direct route might be found from Baghdad to Shustar. Were Shustar to be excluded, it is probable that Captain Cameron's proposal to take in Haweizeh would commend itself to approval, and the passage of the Karun be effected at Ahwaz, in which case a branch line would naturally be constructed to reach Shustar and Dizful. But details must be dependent upon the exact character of the country to be traversed, and old beds of rivers and other channels belonging to an ancient system of irrigation may offer obstacles even more complex to deal with than those of a dry mountainous region. On the other hand, for the railway to Bebehan, we have a time-honoured track from Shustar, and the record of Captain Wells' own journey from Ahwaz for guidance; while for the prolongation to Shiraz, the latter officer has enlightened us with suggestions which not only indicate a

complete line, but an alternative also.[1] His remarks on the subject are all the more valuable as coming from one who is not only a naturally keen observer, but also a professional engineer. They are to be found in the Proceedings of the Royal Geographical Society for March 1883 :—

"I think," he writes, "the railway engineer would prefer to take the line from Shustar *vid* Behehan to the Ardakhan Valley. He would find no stupendous obstacles this way, and would have wormed himself to the roof of Central Persia, without crossing one of the ridges that guard it : he would tap, too, its most fertile plains and include Shiraz. The 7200 feet *Kotal* that lies between Ardakhan and Shiraz has no difficulties or gradients that a 'Fairlies' engine, such as is used between Poti and Tiflis, would not surmount, or I should recommend the trial of the valley of the Shahpur river from Bushire to Nodun, where a tunnel would lead through to the river Shur or Fahlyun which runs from Ardakhan."

To this direct testimony of an officer who has actually gone over the ground described, I am not now in a position to add the views of other similarly qualified travellers : but, certainly, General Schindler, and, possibly, Sir Oliver St. John, would be able, if present, to throw some fresh light on the subject. In the meantime we possess, I think, quite sufficient data to warrant a detailed survey, should the line sketched out be acceptable in a sense irrespective of physical difficulty. On the intrinsic value of the line, commercially, as well as generally, I hope to say a few words ere concluding this paper. Let us now turn to the section of railway in that remaining part of the Shah's territory, which comes fitly under the head of Persia proper.

Of the country due east of Shiraz a very good account has been given by recent explorers—notably Sir Oliver St. John and Colonel Lovett—but for the tracts between Shiraz and Bandar Abbas our most recent information is to be gained from Mr. Preece's paper, read before the Geographical Society in January 1885, to which I would now solicit your brief attention. This gentleman travelled from Shiraz by the upper of the two roads marked in our map. His noteworthy stations were Fassa, Darab, and Forg. Up to Darab he reckoned his distance at 145 miles : this had been estimated in 1808 by a French explorer, M. du Pré, at 143 miles, and in 1850 by Consul General Abbot at 136 ; but it is not improbable there may have been some slight difference in the actual track followed. Preece's marches from Darab to Bandar Abbas were reckoned at 196¼ miles, about two or three in excess of M. du Pré's computation, supposing the farsakh to be 3½ miles. In quoting a passage from his paper, I would ask you to understand that I am quoting the words of a trained official of considerable local experience—bearing, moreover, a name not unknown to the scientific world. He says :—

"Should at any time the question of a railway to the Persian Gulf take tangible form, a careful survey of this route, I am convinced, will repay the projectors. As against the Shiraz-Bushire route there can be no doubt of its greater adaptability. It is true it is nearly double the

[1] Colonel Bell has, moreover, alluded to a pack-route leading from Ahwaz to Shiraz, "275 miles distant, done in 13 stages by mules."

distance, but against this it has several advantages; in the first place, the engineering difficulties are nearly *nil*, whereas those on the Shiraz-Bushire are innumerable; secondly, it would decrease the sea journey by some 450 miles; thirdly, at or near to Bandar Abbas a convenient and sheltered roadstead could be found, in place of the extremely inconvenient and open one at Bushire; fourthly,"—and here we have an argument of primary importance in establishing our case—"a railway along this route would tap a large grain-giving country, and would be easy of access to the merchants of Yezd and Kirman."[1] The comparison with a Shiraz-Bushire line may be set aside as irrelevant, but the statement as to the non-existence of engineering difficulties is most material. At the same time, it is well to note that there is an alternative route between Shiraz and Bandar Abbas, running south of Mr. Preece's, *viâ* Lar. It is mentioned by a late French traveller, M. Rochechouart, who gives to it a distance of 360 miles. He reports that Lar is an important place, and that the surrounding country is rich in cereals, cotton, and tobacco; but that while the tract on the Shiraz side of the town contains fine fertile plains, that on the Bandar Abbas side is desert.[2] M. du Pré had also travelled by this route on returning to Shiraz from the sea. His narrative of the journey is instructive and interesting. He reckons the distance at 97½ farsakhs, or 341 miles, of which 201 separate Lar from Shiraz, through Jihun and Jarun.[3]

If the line by Darab and Forg were adopted, I am not sure that a modification of Mr. Preece's route might not be recommended in the more immediate neighbourhood of Shiraz itself, by striking into the road along the southern shore of Lake Niris, particulars of which have been also supplied to the Royal Geographical Society by Captain Wells. But these are matters of detail which would be discussed at the proper time. I now propose to make a few observations on the great advantages which a line such as that proposed would possess over a coast line along the somewhat inhospitable shores of the Persian Gulf. East of Bandar Abbas the railway to India would meet with few serious physical obstacles in passing on to the Mekran coast; and for the Mekran coast itself, its configuration and character, I would refer those interested in the subject to the paper, of which the present one is but a supplement, as well as to my former reports published in the Journal of the Royal Geographical Society.

Independently of Baghdad (which is Turkish), there are three places of great commercial importance and more than local repute in the section of country which has just been brought to your notice. These are Shustar, Shiraz, and Bandar Abbas. In confining my remarks to the three only, I am fully sensible that Ahwaz, Ram-Hormuz, Bebehan, Niris, Darab, and Lar have each, more or less, a good secondary claim to consideration; and I now only put them aside from a necessary regard to your time and convenience. They, and indeed other places on our

[1] Journey from Shiraz to Jashk, by J. R. Preece; Supplementary Papers, *Roy. Geog. Society*, vol. i. 1886, pp. 401-37.

[2] *Souvenirs d'un Voyage en Perse*. Paris, 1867.

[3] *Voyage en Perse*, tome premier, pp. 434-41. Paris, Dentu. 1819.

Persian line, will always be admirable subjects for the Bradshaw *raisonné*, such as we may anticipate will be demanded by future travellers.

Shustar on the Karun has a history which ante-dates to the third century. Legend ascribes its celebrated bridge and dams to its probable founder, the first Shapur, or Sapor, whose captive, the Roman Emperor Valerian, is said by Persian annalists, not always true historians, to have been employed by his conqueror in manual labour. As the chief town of Khuzistan (the modern Arabistan), it enjoyed for many centuries a specially high reputation which, under the Mohammedan successors of the Sasanian kings, assumed a religious rather than secular character. According to the appreciative French lady—to whose able descriptions reference has already been made, and who thoroughly investigated the story of Shustar on the spot—the capital of Khuzistan, when freed from the evils of war and sieges, fell into the hands of the doctors of Islam, and, so powerful was their influence upon the inhabitants, that in course of time it grew to be a rival of Kum and Karbala, the great centres of Muslim bigotry and intolerance. We need not now enter into the causes of its moral deterioration or visible decay in later times, nor comment upon its present comparative insignificance. Rather let us draw attention to its geographical position; for we find it situated on two great lines of Persian commerce, one reaching it from Teheran through Kum, Burujird, Khormabad, and Dizful, the other by branching off from Kum to Kashan, Ispahan, the Bakhtiari country, and Arabistan. I might add a secondary but direct line of traffic leading to it from Tabriz, parallel with the Turko-Persian frontier and passing through Senna and Kirmanshah. In any case, there can be no doubt of the immense importance of Shustar as a station on the main line of railway connecting India with Europe; and when reached by steamers navigating the Karun from Muhamra, it would be unrivalled as a commercial emporium for Western Persia.

Under the head "Shiraz," in the latest edition of the ever instructive *Encyclopædia Britannica*, we read:—"A celebrated city in Persia, capital of Fars, from its site and thoroughly Iranian population may be considered the central point, as it were, of Farsi or Parsi (otherwise Persian) nationality." This, indeed, is the true definition of a city which, in whatever light we regard its claim as a comfortable residence for Europeans, remains up to this hour the pride and glory of its inhabitants; renowned and loved, not only for its climate and products, its mosques and bazaars, but also honoured and revered as the seat of kings, and birth-place and burying-place of poets. I will not attempt to give any account of a spot which has been often visited by travellers writing with far more descriptive power than I can pretend to possess; but those who would learn something of it in detail are referred to the many published works of English and foreign authors in the seventeenth and nineteenth centuries, beginning, say, with Pietro della Valle and Chardin, and ending with Dieulafoy and Dr. Wills. In a commercial aspect, and as regards geographical position, it is well situated on a main route (I might almost say *the* main route) of traffic leading from Tehran to Bushire. It is only 180 miles from the latter port, and is reached by secondary routes

from Yezd and Kirman. As an emporium it would have no little value, even though its graven seals, choice inlaid wood, and ivory work, celebrated wines, and manufactures of earthenware and glass, would tell lightly perhaps in the account of exports; neither are its shawls fit to compete with those of Kirman, nor its carpets with those of Kurdistan. But the local *prestige* of Shiraz alone would serve to popularise the line on which it was a main station among the Shah's subjects, whereas the omission of the favoured city would be detrimental to success. As to Bandar Abbas, its importance in connection with a line of Persian railway will be seen at a glance, if the map referred to only indicate the main line of commercial traffic from Yezd to Kirman, branching into two lines from that city to the sea.

When the port was visited by Colonel (now Sir Lewis) Pelly in the beginning of 1864, he found it "a walled township of about 8000 or 9000 inhabitants, with suburbs . . . destitute of any pier or other artificial improvement, with an inconvenient roadstead, having only from two to three fathoms water at a distance of two miles out."[1] I landed there some seven years later, and was certainly not impressed with the advantages of the place for shipping;[2] but it has served the purpose of a port for centuries, and must still be considered in that light when the question of a sea outlet for Persian commerce is under discussion. The discovery of a "better and more sheltered position about four miles to the westward," reported by General Pelly, may yet be made available to meet the requirements of a railway station. Mr. Preece, who was on the spot in 1884, bore witness to the intelligent action of the local authorities of Bandar Abbas. "The acting governor," he wrote, "has repaired the factory of the old Dutch Company, and made it into one of the finest houses in Persia;" and, he added, "he is also now building a small stone pier opposite to it, to facilitate the landing of cargo from the ships." This is very satisfactory information to receive from a part of the world where reforms are unexpected in the right direction. I know that it is the common practice to look upon Persia and things Persian as secondary considerations in the great game of the world's politics. It is also quite in accordance with ordinary precedent to describe the Persian character as hopeless and the Persian Government as irreclaimable. Happily, however, for the present age, those Englishmen who have recently travelled through the Shah's dominions have not only been explorers capable of appreciating the regions explored, and forming and expressing independent opinions on them, but the report which they have rendered to their compatriots has been of a nature to make England more interested in the amelioration of the country and people visited. The extension of water communication inland; the improvement of existing lines of traffic and opening out and development of others; the general suggestions and recommendations of Colonel Bell and Mr. Curzon, Major Wells, and Sir Murdoch Smith; all these are indica-

[1] Visit to Lingah, Kishm, and Bandar Abbas, by Sir Lewis Pelly, Acting Political Resident, Persian Gulf.—*R. G. S. Journal*, 1864, p. 257.

[2] *Eastern Persia*, vol. i. pp. 226-7. Macmillan. 1876. *Journal Roy. Geo. Socy.* (1873), p. 65.

tions that both theory and practice are actively at work for the benefit of Persia, the outcome of the movement being necessarily a stimulus to commerce and the direction of the native mind into a comparatively healthy channel.

For my own part I have great faith in the drastic remedy of the locomotive to awaken a slumbering but active-minded people, for whom it would be a novelty of high price and usefulness. But I must not disguise the fact, that the section of railway so imperfectly brought to your notice this day has not its origin in the mere wish to benefit a particular nation, but rather in the intention of completing a link in the inevitable great line of connection of England with India, which should be as readily available to passengers and goods as any of our home lines.

## *APPENDIX.*

The paper on "Communications with British India under Possible Contingencies," of which the foregoing is but a supplement, will be found in Vol. XXII., Journal of the Royal United Service Institution for 1878, as well as the discussion which followed the delivery of the lecture. On that occasion the late Mr. Gifford Palgrave expressed his full concurrence in the importance of the line proposed, but adhered to the opinion he had before recorded when giving evidence before the Select Committee on the Euphrates Valley railway, that the starting-point should be Alexandretta in preference to Tripoli, or any other point on the Syrian Coast. Mr. Hadden, C.E., at one time Engineer-in-chief to the Turkish Government, gave some valuable evidence on the several Lebanon passes, and added some pertinent remarks in support of the scheme as offering an alternative route to that of the Suez Canal. General Sir Arnold Kemball was opposed to the line in a financial and commercial point of view, but saw no material obstacles in the way of its actual construction ; and the Chairman (the late Sir Henry Yule) thought that the great difficulty to be met would be the little likelihood of inducing Parliament to grant the necessary money.

But it may be interesting to recall the opinions expressed in the public press on a question which, so far from being permanently set aside, cannot but be regarded as liable to resuscitation at any time. The retrospect has especial relevancy in connection with the proposals put forward at the present day for improving the means of inland communication in Persia. These, it need hardly be said, would be affected in an eminent degree by a railway running from Baghdad to Bandar Abbas.

In addition to a very full report of the lecture, the *Times* (17th June 1878) devoted to the subject a leading article, the greater part of which is here reproduced as containing by far the most important objections which could be urged more than twelve years ago to the particular line then proposed :—

*The Times*—LEADING ARTICLE—17*th June* 1878.

"Sir F. Goldsmid has chosen a very opportune time for discussing the proper route from England to India. His lecture, which we print this morning, contains a great deal with which our readers will heartily agree. That we have duties to discharge towards India, and that we receive in return benefits from our far-off

possession, will scarcely be questioned in any quarter. It follows, as a matter of course, that we must keep a firm hold upon the country, and that we must have the means of communicating with it under all contingencies that may present themselves. But whether Sir F. Goldsmid's scheme to secure this is in any real sense practicable is another matter. There are a good many steps to be taken in carrying it through, and each of them is open to very obvious objections at the outset. Sir F. Goldsmid is not satisfied with our existing line by sea through the Suez Canal. It is, he thinks, not speedy enough for the exigencies of modern life, and it is less completely in our own power than he would wish our line to be. He suggests, therefore, an improved course, which would certainly be shorter and quicker, but which would, we fear, be even more exposed than the one he aims at superseding. The first thing to be done towards constructing it is to obtain possession of some convenient station in the eastern part of the Mediterranean Sea. Cyprus, he thinks, would be on the whole the best fitted for the purpose, and he has much to say on the capabilities of Cyprus both in itself and as a point of departure for India. When we have firmly established ourselves at Cyprus, we are then to step over to the mainland and set to work on a railway to the head of the Persian Gulf. This is to be met as nearly as possible by another line running along the Mekran coast westward from Karachi, and forming, with the help of the existing Indian railways, a connection between every part of British India and the eastern Mediterranean shores. We should thus, it appears, be able to keep our communication with India open in spite of any combination that might be formed against us. If Russia and Egypt join hands and shut us out from the Suez Canal, we can get to India partly by sea, partly by Sir F. Goldsmid's railway. If we are deprived of this, we can still fall back on the Suez Canal, and shall be no worse off than we are now. But most formidable of all, in Sir F. Goldsmid's opinion, is the combination of Russia and Turkey. This, however, is a danger which does not immediately threaten us. Strike while the iron is hot, is Sir F. Goldsmid's advice. Get hold of Cyprus and of the necessary points of Turkish territory through which the new railway is to run. When we are once in possession of these, the enmity of Turkey will be deprived of all its terrors. The negotiations for all this may, Sir F. Goldsmid suggests, form part of the business of the Berlin Congress. Turkey just now will give us anything we ask her for, and there can be no good reason why we should be too modest in our requisitions.

Let us suppose, however, that all preliminary difficulties are overcome, though they are scarcely quite as insignificant as Sir F. Goldsmid appears to consider them. Let us grant further, that the engineering part of the work can be carried out successfully, and at an expense so far moderate as to be within our means if we choose to undertake it. The question remains still, what in ordinary times the railway will be worth when we have got it, and what advantages it will offer over the route we now follow. It will be shorter in distance and still more in time, is Sir F. Goldsmid's reply. But against this we must set the obvious inconvenience of a route with so many breaks. The traveller, or the merchandise, which sets out from Calcutta will pass first by a long land journey to some point on the coast at the entrance of the Persian Gulf. The course thence will be by sea up the Persian Gulf to the point from which the railway starts for the Syrian Desert and the Mediterranean.[1] From the western terminus of this the rest of the journey will be done by sea, or by land and sea in turn. The difficulty, anyhow, will be at an end, and the man or the goods will be in very much the same position as the

[1] The section of railway now proposed would carry the traveller at once from Karachi to the Mediterranean.

passage of the Suez Canal would have placed them in. The difference on the creditor side will be one chiefly of time. But the cost at which the saving of time will have been made is far from inconsiderable. To load and unload goods four times when once would have been sufficient is scarcely what any merchant with an eye to profit would choose to do. To travel by railway over a long line of desert and in all the heat and discomfort of a tropical climate, and to change first from railway to steamer, then back again to railway, and then to steamer once more, would be a thing which it would need a very strong and energetic traveller to get through. Most men, we imagine, would prefer the simple plan of taking a steamer which would bring them straight through, and would land them on their own shore if they desired it. A few iron frames might choose differently, and there might be cases, too, in which time was of exceptional value, and must be saved at any cost. But for every Hercules and every Queen's messenger who passed to or fro by Sir F. Goldsmid's route there would be dozens of ordinary mortals, less strong and less busy, whose only choice would be between the Peninsular and Oriental and its rivals of the same species. That there would be no commercial return for such a railway as Sir F. Goldsmid suggests was the comment of Sir A. Kemball and of Colonel Yule. It is almost fatal by itself. The railway which will not pay, and which scarcely seems ever to be intended to pay, can be justified only by overwhelming military exigencies. Where are cases, we may admit, in which it can be thus justified; but the case before us does not seem to be one of them. Instead of setting to work in Cyprus and Syria, and constructing lines on territory which does not belong to us, and which it would be almost impossible to guard, we should do better, Sir A. Kemball thinks, to turn our attention to Egypt at once. The prize would at least be more valuable, and the initial objections to our obtaining it no greater. But perhaps Sir A. Kemball means only that we ought to maintain friendly relations with Egypt, whatever may be the attitude of her present suzerain. This is reasonable enough. But when we come to making provision against all contingencies, however distant in prospect or however unlikely to occur at all, we shall have no lack of work cut out for us. We intend to hold India, and we believe that we are well able to do so against any possible invaders. But whether it is worth while to act on the assumption that Russia and Turkey may some day unite to deprive us of India, and that we ought therefore to throw ourselves into the jaws of Turkey without delay, is another question. We should scarcely gain in safety by doing so, and we should gain just as little in anything else. If we had Sir F. Goldsmid's railway, or rather series of railways and steamers, all ready to our hand, and actually working; if every expense had been met and every difficulty of construction overcome, we should be only too glad to exchange it all together for the Suez Canal. We are not likely, therefore, to follow the reverse course, and to surrender what we have got already, and what is very much more valuable to us than the costly and uncertain benefit that is offered us instead of it. A railway on a foreign soil is neither safer nor more convenient than a canal through a foreign State. We could fight our way through Egypt if the need came as easily as through Syria. We have little expectation of being called upon to do either. But the fact remains, in any case, that our shortest and best route to India lies, in some part, through territory which is not our own, and which the rest of Europe is not likely to permit us quietly to appropriate. The longer passage by sea must be always open to us, and though we should not choose it if the choice were given us, yet it is about as short as any by which our antagonists could proceed, and it is a good deal more easily traversed."

Referring to the above article, and the unfavourable conclusions drawn therein

to the Euphrates route, the late Sir W. P. Andrew thus addressed the editor of the *Times* :—

"I would ask you, in common fairness, to give insertion to a short extract from the report of the Select Committee of the House of Commons on the Euphrates Railway in July 1872, which appears to be ignored in recent discussions, although based on the evidence of such men as Lord Stratford de Redcliffe and Lord Strathnairn, who certainly appear entitled to some consideration :—

"'They (the Committee) are not aware of the period within which the system of railways connecting Kurrachee with Peshawur may be expected to be completed ; but whenever this shall have been done, there can be no doubt that a route by way of the Persian Gulf and Kurrachee will afford means of communication between England and the Punjaub and North-West frontier of British India superior to those afforded by way of Suez and Bombay. Speaking generally, your Committee are of opinion that the two routes by the Red Sea and by the Persian Gulf might be maintained and used simultaneously ; that at certain seasons and for certain purposes the advantages would lie with the one, and at other seasons and for other purposes it would lie with the other ; that it may fairly be expected that in process of time traffic enough for the support of both would develop itself, but that this result must not be expected too soon ; that the political and commercial advantages of establishing a second route would at any time be considerable, and might, under possible circumstances, be exceedingly great ; and that it would be worth the while of the English Government to make an effort to secure them, considering the moderate pecuniary risk which they would incur. They believe that this may best be done by opening communications with the Government of Turkey in the sense indicated by the semi-official correspondence to which they have already drawn attention.'

"The moment would appear to have arrived for giving effect to the recommendation of the Select Committee of the House of Commons."

Among other letters which followed in the columns of the leading journal, the following from Sir Arnold Kemball, and a rejoinder from Sir F. Goldsmid, are selected as the more pertinent to the question under consideration :—

"Sir,—Referring to your leader of to-day on the paper read by Sir F. Goldsmid at the United Service Institution on 'Our Communications with British India under Possible Contingencies,' I crave permission to state that the view I propounded with respect to his proposal was precisely that which you pronounce to be 'reasonable enough.' In the report of the lecture I am correctly reported as holding 'that if there should be a Russo-Turkish alliance, then the British should turn their attention to Egypt.'

"My contention was that a line of railway constructed over a waterless desert at enormous cost, and affording for reasons stated no prospect of remunerative return, could never supersede the Suez Canal as a commercial highway, while under the contingencies contemplated it would obviously be easier for us to secure our position in Egypt than to undertake the defence of 1000 miles of railway carried under the worst conditions through an enemy's country. Again, as regarding Koweit, though admirably suited for the terminus of a railway, I remarked upon its selection as precluding the avowed intention of extending this line at some future time to meet another line coming from India. I stated my preference for a line from the shore of the Mediterranean to Mosul, destined to join a main trunk line from Constantinople, and following generally the present high post road

to Bussorah, as combining the commercial and international advantages indispensable to the success of any scheme of which the realisation should depend on British enterprise. This main line would be susceptible of ramification, with time and occasion, in any desired direction. By attracting the produce of the adjacent tracts of rich and comparatively populous countries, it would be, to a certain degree, remunerative on every section ; and, regarded from a political or military point of view, it would assuredly subserve British aims and interests to an extent to which no line merely connecting the Mediterranean Sea with the Persian Gulf (in itself scarcely defensible), and passing in its whole course beyond the scope of strategical operations in Asiatic Turkey, could pretend.

"The only recommendation advanced for the Desert line is a gain of time, a gain more than questionable in the face of the objection of repeated shipments and transhipments, as compared with the transit through Egypt, and more than counterbalanced by the normal advantages of the Euphrates-Tigris Valley route.

"Finally, my view implied dissent from the annexation or occupation, however temporarily, of any portion of Turkish territory, including Egypt, save under the exigency of self-preservation ; just as my alternative proposal contemplated the goodwill and co-operation of the Government of the country as the best security against the dreaded contingency.—I am, Sir, yours faithfully,

"*June* 17. A. B. KEMBALL, *Lieutenant-General*."

"SIR,—I am quite aware that in soliciting insertion of a letter from myself, in addition to those which have recently appeared from Mr. Andrew, Mr. Danvers, Mr. Haddan, and Sir Arnold Kemball, I am asking a great deal, and that unusual space has already been accorded in the *Times* to the subject of my paper read at the United Service Institution on 'Our Communications with India under Possible Contingencies.' But though I may bear patiently your own charge of proposing means of conveyance for a Hercules or a Queen's Messenger rather than an ordinary traveller, I should regret to be considered the uncompromising votary of encroachment upon another's territory. Sir Arnold Kemball, in explaining that his expressed view on the matter implied dissent from annexation or occupation, however temporarily, would seem to infer that I had suggested something involving one or both of these measures, whereas, in contemplating the probable existence of a 'Palmyrene railway,' I had left to more distinguished politicians to determine whether the object should be attained 'by payment, or in compensation for claims, or as part of an Anglo-Ottoman scheme of mutual benefit'—not with a thought of seizure. The hypothesis presented in this case is no Cretan labyrinth, and the limited experience I have had in such affairs enables me to see a way through it which should be patent enough to professional negotiators.

"My meaning in the whole scheme is this, nor have I hitherto heard any arguments to prove it a fallacy :—We may want a rapid means of conveying troops to or receiving troops from India which the Suez Canal may not always suffice to give us. Here is one, costly and unremunerative in appearance, but the least costly, in respect of distance, of all the schemes proposed, and only less directly and immediately remunerative for the space across the Palmyra desert. But do sums of money voted by Parliament for particular objects invariably bring in direct or immediate money returns? Are not millions voted and, may we not hope, they will continue to be voted, should occasion require, for things which, in the mere sense of pounds, shillings, and pence, are sterile and gainless? Commercially considered, however, what material profit might not eventually arise from a speedy communication with India *viâ* Turkish Arabia, whether the line from the Euphrates

to the Mediterranean have its western terminus at Alexandretta, Suedia, Ruad, Tripoli, Tyre, or Beirout?

"In other respects, the main objections made to the Palmyra line are want of water, scarcity of labour, and exposure to an enemy. The last is, in other words, to urge that strategical considerations have been neglected in the selection. I reply briefly on each point.

"1. Water, at least enough for working parties, can be procured from wells where canals and watercourses may not be carried; and the provision made for working parties should suffice for the requirements of a few insignificant railway stations and the passengers to and fro the line. The restoration of Palmyra, if to be accomplished, will be an independent result of the establishment of a railway, but no part of the work of its projectors. That a city of such repute existed at all in the heart of the so-called desert for 1200 years would seem to indicate that water cannot be far off. This great essential may now be wanting, it is true, but, as Captain Burton says, "at one time it was extremely well supplied by extensive aqueducts, and every house appears to have had its rain cistern."

"2. Scarcity of labour might, I imagine, be provided against by tact and acquaintance with tribes and inhabitants of the coast and country. A ten days' experience with Arabs at the head of the Persian Gulf when burying the sea-cable in 1864 was conclusive to my mind on the immense power and attraction of regular daily payments. Commencing with about 200 men on the 30th of March, there were 242 on the 5th of April, and three days later the number of my labourers had increased to 352. This was at Fao, or Fava, a place of barely a score of settled inhabitants, now a telegraph station.

"3. Strategical considerations are said to be against a line in the heart of Asiatic Turkey, because in the event of war with the Turks our rails would be in the hands of the enemy. But so would it be with the Euphrates or Tigris routes; only from their course through fertile tracts they would hold out far stronger inducements to hostile interference; and their less isolated position would make them more readily reached by aggressive troops. Besides, this helplessness to defend our desert line (which should by no means be the certain outcome of available depôts east and west) is the precise 'contingency' in which, let the worst come to the worst, we should have a sure provision in the Suez Canal. On the other hand, were our battle-field in Egypt, we should resort to the alternative means of communication through Palmyra and Asiatic Turkey which I have now the honour to propose.

"As regards the unprofitableness of the tract selected, I would recall the conclusions of Mr. Anthony Trollope on the character of the American hotel. He says:—'When the new hotel rises upon the wilderness it is presumed that people will come there with the express object of inhabiting it. The hotel itself will create a population, as the railways do. With us railways run to the towns, but in the States the towns run to the railways. It is the same thing with the hotels." And I maintain that the argument is doubly strong in the revival of a line of traffic the record of which shows a vivid historical fact antedating some two thousand years. But this anticipation is irrespective of strategical and political considerations—it is the peace, and unquestionably the more hopeful, possibly the more likely, aspect of the question.—Yours obediently,

"*London, June* 21. F. J. Goldsmid, *Major-General.*"

Three or four days later (25th June 1878), a leading article in the *Daily Telegraph* appeared, reverting quite unexpectedly to the same lecture, but treating it in a new point of view. Its republication may prove interesting, and its apparent

egotism, as an extract, excusable, not only from the importance which it gives to the then foreshadowed occupation of Cyprus, but in bringing out, as it does, the curious coincidence of the occupation in reference to the lecturer's proposals.

*The Daily Telegraph, 25th June* 1878.

"A name has been uttered lately, and by a high authority on Eastern subjects, General Sir Frederic Goldsmid, which we repeat because we think it possible that it is a name which may be heard frequently in the next few months, and under circumstances very interesting to Englishmen. The word to which we allude is 'Cyprus,' and we are mistaken if a good deal of attention will not soon be concentrated on this fair and fertile island, the seat of powerful kingdoms in the past, and destined, it may be, to a great revival of prosperity and importance. It is growing clear now how the settlement of the Congress will mainly come out. The unshaken firmness of Lord Beaconsfield, enforcing the policy so long upheld in these columns—with the staunch support of Austro-Hungary and the applause of the British people—has prohibited the destruction of the Turkish Empire in Europe, and laid the foundations of a diminished but stronger territory, which, by the nature of things, will have protection from the Powers who have preserved it. When the discussions of fhe Congress pass over into Asia, Great Britain will have to rely there on her individual arrangements, and the nature of these has been already indicated. We shall be charged *d'une mesure spéciale*, with repressing any further Russian advances beyond the extent of plunder formally granted to the Czar, and this must be done in connection with large systems of administrative aid to the Sublime Porte. For this aid a basis must be established, and it may turn out—as Sir Frederic states—that 'Cyprus' will prove a word by no means unconnected with such a basis. Nothing can be plainer than that the conclusion of peace will leave the questions of Egypt, Asia Minor, Syria, and Palestine, and, above all, of our alternative roads to India, more momentous than ever. It is not at all beyond expectation, therefore, that study has already been directed to the search for a new and commanding station which should confer influence in regard to all these points, and at the same time offer enhanced facilities to British action for military, naval, commercial, and communicatory purposes. It appears even possible that the construction and guardianship of an overland railway to the Persian Gulf, or further, must henceforth emerge from the list of speculative projects, and become a task of obvious and imperative concern, both for Imperial reasons and for the development of the vast agricultural resources of the Euphrates and the Tigris Valley. If, therefore, in view of ends so beneficial both to Turkey and to Great Britain, and so perfectly free of objection as regards the European Powers; some project of the character indicated by these remarks could be devised, the British public would applaud the thoughtful and faithful policy of the Premier, and understand why we repeat the classic title of this noble island, the name of the beautiful and well-placed Cyprus.

This word has, we have already said, been recently spoken by a competent authority in relation to those measures of development and Imperial precaution which the issue of the Congress may oblige England to take as regards the future of Asia Minor. A paper of research, as well as significance, was read some days ago at the United Service Institution by General Sir Frederic Goldsmid, on the topic of "Communications with British India under Possible Contingencies." Sir Frederic Goldsmid is an acknowledged expert upon this large problem. He has served in the Crimea and in India in important posts; he helped to establish the Turko-Asiatic line of telegraph, together with the late Colonel Patrick Stewart; he negotiated the Indo-Ottoman Telegraph Convention, and assisted in settling

the Seistan boundary line between Persia and Afghanistan. A Knight of the Star of India and Companion of the Bath, Sir Frederic spoke on this matter with patriotism, experience, and *connaissance de cause*, and the chief text of his interesting lecture was, throughout, 'Cyprus.' Seeking near and far for the most convenient *point d'appui* for a maritime and commercial station which should best guard the head of a new railway route to India, and afford to British interests a counterbalance for the menace inseparable from Russian annexations, the spot to which he directed the attention of his audience was that fair and extensive island which lies in the Syrian corner of the Mediterranean. Cyprus in the hands of Great Britain, General Goldsmid said, would be an invaluable acquisition, and worth any amount of land on the coast. The distance from it to the several ports of the mainland is not great. A railway terminus for the Persian Gulf line might be reached thence in a very few hours, and fair-weather boats might carry over a thousand passengers—troops or civilians—at an inconsiderable cost. The possession of Cyprus would facilitate the selection of such a terminus ; for with so convenient a tenancy we only require on the mainland a landing-place, offices, sheds for temporary accommodation of troops, and residence for a small railway staff provided for our headquarters in the island. The General is in favour of commencing work at Tripoli or Tyre for the inevitable Indo-European railway, and of taking it through the Palmyra desert to a suitable point on the Euphrates, and thence to the Persian Gulf. But he urged that we should in any case inaugurate our operations for overland communication with India by establishing a depôt both for men and materials at the island of Cyprus. He did not consider it romancing to say that the journey from the island to Karachi might in this way be accomplished within a week, allowing a day and a half for embarkation and disembarkation. The total distance is two thousand one hundred and fifty miles, which, at twenty-five miles an hour by rail and ten miles an hour by river, gives a total of 126 hours ; and, allowing for delays thirty hours, the travelling time reached is 156 hours, or six and a half days. The lecturer, however, dwelt principally on the advantages of an island stronghold in this sea, to all intents and purposes British ; protected by a material force—not a mere ship or two, with a guard of marines—but with powerful garrisons as well as depôts. He concluded by observing : 'I should be very glad to think a practical notion of this kind could find place among the minor considerations of the great Congress now sitting ; for, if peace follows the present negotiations, no time should be lost in carrying out the railway, whether its existence have been provided for by payment, or in compensation for claims, or as part of an Anglo-Ottoman scheme of mutual benefit.'

"In connection with this 'Anglo-Ottoman scheme of mutual benefit,' it is worth while to look a little closer at Cyprus, which, having been so important in ancient times, may thus, perchance, recover its fame and celebrity. Nearly 150 miles long, with a breadth of from 55 to 27 miles, it is an ample dominion in itself, and one of the most beautiful and most capable in the world. Its alleged malaria is a calumny founded on the habits of a few rash travellers who expose themselves and eat improper food. The birthplace of the Queen of Gods and Men is as salubrious, with just precautions, as it is beautiful, albeit decidedly hot in the summer months. This heat, however, is tempered by the winds from the snowy summits of the Karamanian mountains, and eternal sea-breezes cool the littoral plains. The fields produce, even with a lazy husbandry, wheat, barley, cotton, silk, madder, olives, carobs, and splendid vines ; while in the north and west are magnificent forests full of game, and of the wild cattle and swine descended from those which have strayed from the folds and styes of old civilisation. Larnaka, the principal port, gives travellers a wrong impression of the lovely and fertile island ; for that

town, which owes its existence to a good anchorage, but was chosen too hastily on this account by the Crusaders, stands in the worst region of Cyprus, and presents a very different aspect from the exquisite districts around Episcopi, Kuklia, and Baffo—the antique Paphos. In the magnificent valleys near Maratassa the finest timber is to be found, and only roads are wanted to establish a great trade in this commodity, while rich land is to be seen all along the shore-way to Cerinea and Nicosia, or Leucosia, the capital. Famagusta—the old *Fama Augusti*, named to commemorate the battle of Actium—is one of the many spots along the coast which might be made impregnable, though the harbour is no doubt small and neglected. It is needless to say how intensely interesting to the scholar and antiquary the whole island must be, with its relics of successive waves of old-world dynasties, its immemorial cities, the monuments of its native 'nine kingdoms,' and of the Libyan, Phœnician, Greek, Macedonian, Roman, French, Genoese, and Venetian civilisations which have in turn possessed it. The population of Cyprus at this day is said not to exceed 100,000, but there is good soil enough in the sunny island to maintain a hundred times as many, if it had the tranquillity and assistance of a strong and settled government. The phrase applied by Tacitus to Lesbos—*insula nobilis et amœna*—is still more fitted to this splendid jewel of the Syrian Sea, whereon, there is no doubt, a very excellent and profitable terminus and depôt of the Indo-European Railway might, indeed, be established, if, after all these troublesome times, Turkey should finally confide her safety and future hopes in Asia to the Power chiefly concerned in them next to herself."

On the 8th July following a leader in the same paper thus commenced :—"We have reason to believe that there will be communicated this day to the Plenipotentiaries in the Berlin Congress an act of high policy on the part of Her Majesty's Government, the effect of which must be at one stroke to transform the relations of the Eastern question and to cast a new aspect on the restored frontiers of the Ottoman Empire." Lower down the column it was written : "We took the opportunity of a lecture delivered by Sir Frederic Goldsmid upon the best method of improving and protecting our overland links with India to re-echo the name of 'Cyprus' which he had let fall, and to warn the public that this was a name likely to assume commanding and imperial interest. Our adumbrations will, in all probability, receive embodiment in fact during to-day's discussion at Berlin, and the world will know through the tidings reported thence that something stronger than any protocol or clause is now raised in Asia against the further progress of Russian ambition westwards by the entry of Great Britain into those Anatolian regions as a protection and a civilising guardian of peace and good administration."

It is to be feared that a tenure of twelve years' duration has not sufficed to demonstrate the value of Cyprus as the *quasi* terminus of a Euphrates Valley railway to India. Or is the concession of right of way from the sea-board of Syria to the Turko-Persian frontier reserved for a *quid pro quo* to our abandonment of Egypt? In any case, original discussion on these matters is out of place in an Appendix.

# SPANISH HONDURAS.

*(Read at Meeting of British Association, September* 1890.)

By Will. Pilcher, F.R.G.S.

As this country is but little known, no work having been published regarding it since Wells' book in 1854, and no reliable map of the country being obtainable, it is possible that a few notes upon its topography, mineral resources, soil, and people, collected during a twelve weeks' trip through some of its departments, in which I rode over 1000 miles on muleback, may be of interest to the general public.

I landed at La Union, San Salvador, early last December, and sailed to Amapala, the Pacific port of the country, in a native boat called a *bongo*, making the journey of thirty miles in six hours. This port is on an island of the same name, lying in the beautiful Bay of Fonseca. The Pacific Mail Company's steamers call there three times a month, and considerable business is done owing to the fact that from both San Lorenzo and La Brea, on the mainland, there are fairly good waggon roads, available for the transport of heavy machinery and suchlike articles to the capital. This is more than can be said at the present moment of the two ports of Puerto Cortez and Truxillo, on the Atlantic seaboard.

But the want of good waggon roads is being rapidly remedied by General Bogran, the present enterprising and far-sighted President of the Republic. Many thousands of *pesos* have been spent by his administration on road-making, and have passed into the pockets of a few energetic Americans located in the country. Among these may be mentioned the roads from San Lorenzo to the capital, 37 leagues; from the capital to Yuscaran, 17 leagues; from the capital to Comayagua, 23 leagues; and from Comayagua to Santa Barbara, now being continued to San Pedro, where it will form a connection with the 36 miles of railway running to Puerto Cortez, so that in a short time it will be feasible to transport heavy machinery and other cumbersome goods from the Atlantic side into the interior.

La Brea and San Lorenzo, the two depôts on the Pacific shore, lie each about 30 miles from Amapala, and a small steamboat conveys passengers and light luggage between these ports, and also acts as a tug for the *bongos* laden with heavy merchandise.

From New Orleans steamers run weekly to Puerto Cortez, so that Tegucigalpa, the capital, may be reached either from the Atlantic or Pacific sides after a five or six days' ride on muleback.

Tegucigalpa is beautifully situated in a fertile valley, through which the Rio Grande runs, at an altitude of 3200 feet above the sea-level, and with its suburb, Comayaguela, separated from the city by a handsome stone bridge, numbers some 20,000 inhabitants. The mean temperature is 70° to 75° Fahr. The streets and sidewalks are clean and paved; the buildings, with a few exceptions, are one-storied, and have windows of

unglazed lattice-work with wooden shutters. Large *portes cochères* give access to an inner courtyard, into which all the rooms open. In fact, this and the other towns I visited resemble those of Southern Spain, possessing also the ever-present town square and the numerous churches.

The President's Palace, with its two stories, glazed windows, and modern furniture, differs from the general type. There is no difficulty in foreigners obtaining an audience of the President, who is ever willing to facilitate in every way the prosecution of their enterprises and the employment of their capital.

A ride of some 50 leagues, in a direction about NNE. from the capital, takes you to Juticalpa, situated in the heart of the far-famed department of Olancho—far famed, that is, among the Spaniards and their descendants, for its fertility, its mineral wealth, its rivers, its forests, and its scenic beauty. "Olancho," as the old Spanish saying has it, "is easy to enter but hard to leave."

Through this department, with its area of 12,000 miles, larger than the Republic of San Salvador, wind the rivers Guayape and Jalan (rich in alluvial gold deposits) on their way past Juticalpa to swell the waters of the Patook River, the latter emptying itself into the Atlantic north of Cape Gracias.

Olancho, in addition to its mineral wealth, which is great, as I can state from personal experience, is the centre in this country of the cattle industry, which is entirely in the hands of the Honduranians. Its fertile valleys and plateaux, particularly that of Lepaguara, are well watered; its fine mountains and ravines, covered with luxuriant herbage, furnish in bountiful profusion the natural requisites for this industry. Fortunes have been, and are still being, made every year in this country by cattle-raising. The chief market is Guatemala; then follow Belize, Cuba, and the home market. Last year over 30,000 head were sent out of the country, and the demand will increase, for foreigners are flocking every month to the surrounding republics, and particularly to Guatemala, to engage in the occupation of coffee-planting, which has turned out to be so profitable. Honduras itself is being gradually opened up, and its population is increasing; and of all these countries it is, owing to its great natural advantages, the best adapted for the above purpose.

On riding through the country you come, from time to time, upon broad sweeping valleys dotted with clumps of pine-trees, watered with innumerable brooks and broad rivers, and rich in herbage, where herds of cattle and native ponies wander at will as well as over the surrounding hills and ravines.

Yuscaran, the chief city of the El Paraiso Department, is the centre of a mining district rich in silver-bearing quartz, with some gold, where the American and German companies are doing well. The latter are working a peculiar vein, in which the metalliferous streak is soft leaden-coloured mud, rich in silver and bismuth. The town itself is picturesque and clean, and, standing at an altitude of 3000 feet, with but little forest round it, is extremely healthy; it has over 5000 inhabitants, who rely chiefly upon the mines for their support.

A visit to the well-known old silver mines of Opoteca took me through

Comayagua, the ancient capital of the country, which formerly contained some 20,000 inhabitants, but now, probably, only about a fourth of that number; it lies about 23 leagues to the NW. of Tegucigalpa, and stands at the end of the Comayagua Valley at an altitude of 1800 feet, with the Cordilleras running from west to north forming its background. The Humuya River, a fair-sized stream, runs past the town through the valley, in which some few attempts at irrigation have been made. It is certainly the least well-watered of all the valleys I passed through.

The decline of the city, which boasts now of seven churches and one ecclesiastical college, is due in a great measure to the decrease of the power of the Church throughout the country. Even now, the numberless religious functions and festivals decreed by the priests are serious hindrances to steady labour and industry, as the natives invariably keep them as holidays, and whatever work may be in hand is consequently neglected.

Opoteca, built on the side of the mountain, in which are the silver mines of the same name, with a lovely little well-cultivated valley at its foot, through which the Humuya River runs, lies at a distance of 5 leagues NNW. from Comayagua, at an altitude of 2500 feet. The town itself is long and straggling, and numbers about 1000 inhabitants; the climate is remarkably healthy and cool; and the inhabitants lead a pastoral, uneventful existence, subsisting on their own produce of coffee, sugar-cane, maize, and bananas, "the world forgetting, by the world forgot."

But their present condition will be changed if the old mines are ever again worked on a large scale. Here you may actually find the famous Tom Tiddler's ground, paved not with gold but with silver: from the top of the mountain to the river extends one vast deposit of silver ore; the church is built on it and of it, and quartz veins are visible running through the streets. The subterranean chambers and tunnels of the old Spanish workings are vast and numerous, and, after some hours' wandering in the bowels of the earth, stumbling over immense masses of rock and *débris* at considerable risk to neck and limbs, you are thankful to emerge again into the light of day, and feel the breath of heaven upon your cheeks.

I passed through many other towns and villages, mines and ranches, in the course of my journey, each with its distinctive features and different surroundings of scenery and cultivation, but in this paper I have not space sufficient to give more than the preceding cursory glance, with the addition of the following general remarks on the country, its people, productions, industries, and possibilities.

Within 25 miles from the Pacific coast you begin ascending, and from that time forward, until you have left the Cordilleras behind and are fast approaching the Atlantic seaboard on the north, you pass through a highland country; all the principal cities and towns are at high altitudes, where the mean annual temperature is about 70°. Even in the dry season a blanket, or at most two, is wanted at night, which, from my experience of Tropical countries, is a good test of the healthiness of a climate in 13° to 16° latitude.

Zymotic diseases are unknown; ague, brought on by exposure to

damp and wet, and ulcers and sores, produced by insect bites and absence of cleanliness, are practically the only two wide-spread complaints of the country; and with care these can be avoided. The seasons are two only, the wet and the dry; the former commencing early in June, and ending in November, during which period the trails are bad, the rivers swollen, and transit of heavy goods impossible.

It is a mountainous, well-wooded country, with numerous fertile plateaux and valleys, where a close network of rivers, streams, and rivulets renders it quite unnecessary to carry water on a journey, for the supply is always abundant, and, except in some few places where the limestone formation affects it, good. In some instances the mountain range appears to run round in a circle, the centre of which is filled with innumerable cone-shaped hills and protuberances without any method of arrangement, like bubbles that have hardened in a caldron after the fire beneath has gone out. The scenery is grand beyond description. In crossing a mountain pass in Olancho, looking towards Nicaragua, I counted five distinct ranges of pine-clad mountains, the last fading away into the sky line, and between where I stood and that sky line were three large rivers, the Guayape, the Jalan, and the Guayampre, besides smaller ones and numberless streams. Limestone and quartzose rock are the principal formations. Evidences of extinct volcanic action abound, and it would seem that the curious configuration of this country should be assigned to this cause. That Honduras and Central America generally are practically unknown to science is to be deplored, for it is certain that much exists here to interest geologists and others. As a foretaste of such interest I would recommend those who care for such things to read an article in *Petermann's Mitteilungen*, 1859, on "Lake Yojoa," near Santa Barbara, and its subterranean outlets.

The natives are half-breeds—the old Indian mixed with Spanish blood. They are Roman Catholics, speak Spanish, are well-mannered, hospitable, and easy-going. "To-morrow" is the watchword of the country. Why do to-day that which you can do to-morrow? There are numerous Spanish families with no Indian taint in them, such as the Zelaya family, the lords of Olancho, and many others. Travelling through the country on muleback is delightful and perfectly safe. The food is simple, and, of its kind, good. Coffee, beans, eggs, chickens, rice, jerked beef, bananas, and plantains form the bill of fare for those who do not fancy the inevitable *tortilla*. A roof under which to swing your hammock and forage for your mules can always be obtained; and if you will use the *suaviter in modo*, and treat the natives as you would treat your English host, all these things are placed at your service at a moderate price.

As regards mineral resources Honduras ranks first among the Central American States; and this is shown by the old Spanish records of the royalty of one-fifth levied by Spain on all mineral productions in these States. Gold-bearing quartz, in well-paying quantities but small veins, is found all over Olancho, and its rivers, Jalan and Guayape, with their numerous tributaries, afford a comfortable living to the native gold-washers with their *bateas*. The Yuscaran district contains quartz, which

yields silver in profitable quantities, mixed with gold. Here is the celebrated old Guayabillas mine, which, from the last century to within a few years back, has yielded largely; in fact, the whole district is full of metalliferous veins running through quartzose rocks. I may mention also the San Juancito mine, between Tegucigalpa and Cataranas, now paying largely, and many others, both gold and silver, in active operation and remunerative—the Minas de Oro, near Comayagua, the famous Opoteca, now like many other old Spanish mines practically unworked, but containing immense masses of ore still unextracted, and, between the capital and the Atlantic seaboard, many mines worked by American and English Companies. The country abounds in old Spanish mines now abandoned, but the old workings show that much ore has been extracted and reduced. It is a curious anomaly in the history of mining in this country that the Spaniards in the old days made mines pay, opening them up as they did without any intelligent system, working them without machinery for draining, crushing and reducing the ore by the most inconvenient and rudest of methods; whereas, in the present day, with all the advantages of established systems and improved machinery, the mines now worked by foreign companies are, with few exceptions, failures. The reason thereof is not far to seek. The promotion and establishment of a company with a large paper, and a small money, capital, the costly incidentals of its direction, and the extravagance and frequent inefficiency of the mining superintendents, who are ever lavish with funds not their own, all conduce to ruin the enterprise.

Honduras, in the opinion of competent judges, is eminently suitable for coffee production. Though there are a fair number of coffee plantations to supply the foreign market, there are many square miles of excellent land waiting to be laid down, and to be obtained for less than half a dollar per acre. Take only the demand of the United States with their 30,000,000 of people, at present supplied chiefly from Brazil, which, in 1888, furnished them with coffee valued at $36,000,000, whilst Central America supplied only four-and-a-quarter million dollars worth; yet the coffee of the latter should command a preference owing to its superior quality, whilst the cost of carriage from its centre of production to its market is much less. Indeed, with regard to carriage, Honduras has an advantage over Mexico and the other Central American Republics from its vicinity to the Atlantic seaboard, whence (from Puerto Cortez) the run to New Orleans lasts only three days. This year when I was in the country, coffee, produced at a cost of 9 cents per lb., was fetching 22 cents per lb., delivered on shipboard.

The increasing demand in the States and Europe for all Tropical fruits is well known, and the export from Honduras of bananas, coco-nuts, oranges, and lemons, has increased enormously in the last ten years. Where there was one small steamer there are now eight large ones. The rapid transit to New Orleans, saving losses by decay, gives Honduras an advantage in this trade, and the carrying capacity of the vessels which can command freights both ways is inadequate for this and other purposes. Travelling through the country, you see growing in large quantities bananas, plantains, oranges, lemons, guava, and other fruit, sugar-

cane, rice, corn, coco, coffee, and other crops, besides uncultivated products, such as sarsaparilla, ginger, vanilla, gum-arabic, and others. The country is particularly suitable for the production and manufacture of sugar. Here fields planted years ago are still vigorous and productive, while in Louisiana the cane is replanted every other year. The United States do not produce one-fiftieth of their own consumption; and when the natural advantages of Honduras and its nearness to its market are taken into account, may not a brilliant future be expected for the country in this industry alone?

Cotton is but sparsely cultivated for native use, and the cutting of mahogany, cedar, and other valuable woods is confined to the coast districts, and to the vicinity of navigable streams, where the wood can be floated to the sea; but these and other industries would assume large proportions in the event of a railway opening up the country.

I would also draw your attention to the all-important fact that, here is a country where the American and the European can labour all the year round, and where the continuity of production, uninterrupted by frosts and bad seasons, which so seriously affect crops in other countries, must ensure steady progress.

Honduras proper has so long borne, through ignorance, a bad name for its climate and the opportunities it offers for successful immigration, being so often confounded with British Honduras, a horse of another colour in every respect, that, in my desire to remove this ignorance and to present the country in its true light, I may take too sanguine a view; but, from my personal experience, prepared to rough it as I was, I can only say the "roughing it" was far milder than I expected, and that, beyond the absence of the luxuries of civilisation, the only drawbacks to travelling through the country, which are impressed forcibly on my remembrance, are the want of cleanliness and the discomforts produced by numerous insects of various kinds.

The political crisis existing at the present moment in Guatemala and San Salvador may seem alarming; but, from conversations I have had with prominent German, American, and English settlers in both these and the other Central American Republics, I can state that these revolutions, petty or otherwise, cause at most but a temporary interference with business, and that the lives and property of such settlers are never endangered.

## THE RELIEF OF EMIN PACHA.[1]

Mr. Jephson's volume on *Emin Pasha and the Rebellion at the Equator* may be regarded as a supplement to Mr. Stanley's official account of the Relief Expedition. It takes up the thread of the narrative at the point where Mr. Stanley deputed Mr. Jephson to act as his representative on

[1] *Emin Pasha and the Rebellion at the Equator.* By A. J. Mounteney-Jephson. With the revision and co-operation Henry M. Stanley. London: Sampson Low and Co. Pp. xxiv, 480.

the two occasions when direct communications were opened up between the Expedition and Emin Pacha. The chief actor in the story—as far as the Expedition was concerned—was, therefore, Mr. Jephson. He alone of Mr. Stanley's officers witnessed the stirring events he has endeavoured to chronicle; and up to the present time no other actor or spectator in the tragic fall of the Province has given a detailed account to the world. It is thus obvious that a peculiar interest attaches to Mr. Jephson's book, since it records the most dramatic incidents in the history of the Emin Pacha Relief Expedition.

Mr. Stanley was fortunate in the choice of his emissary. Mr. Jephson performed his duties in a manner that left nothing to be desired: the remarkable tact, decision, and courage which he displayed—and now so modestly relates—could not have been surpassed even by an older or more experienced member of the Expedition. No less noteworthy is the literary skill with which he has narrated his experiences. If in places he ventures upon criticisms that are either obviously superficial or show bias, these defects in his narrative are no more than might be expected under the peculiar circumstances of the case. In spite of subsequent events that might fairly be supposed to have influenced him, since they have prejudiced the judgment of others, Mr. Jephson has for the most part courageously recorded the opinions he formed on the spot, and entered into his diary, in regard to his experiences in Emin Pacha's province. Only in very few places, where there are manifest inconsistencies, is there any evidence of subsequent revision.

Mr. Jephson's story reads like a romance. Its absorbing interest is sustained throughout. We do not intend, therefore, to discount the pleasure of his readers by recounting the various adventures that befell him during his nine months' companionship with Emin Pacha. It is sufficient to say that, whilst exercising his functions as Mr. Stanley's herald, he stood loyally by the side of the deposed Governor. He suffered imprisonment and insult at the hands of the rebels, and on one occasion narrowly escaped with his life. Our present purpose in reviewing his book in this form is to reproduce what evidence is given concerning the fall of the last Egyptian province in the Súdan. Viewed in this light, Mr. Jephson's volume claims a certain historical importance, and, as such, merits our attention. It necessarily challenges criticism, but any remarks we may have to make must be regarded as strictly impersonal.

Of the political significance of such an event as the relapse into anarchy of the last Egyptian Equatorial Province we need scarcely say much. It was with the intention of preventing such a disaster, as well as the purely humanitarian object of relieving the necessities of Emin Pacha, that the Council of the R.S.G.S. took active steps to bring the subject before the public and to enlist the aid of Her Majesty's Government. It may be remembered that the Society was the first public body to expose the critical position of Emin Pacha in Central Africa, and to urge for prompt steps being taken to relieve him. It was through Dr. Robert W. Felkin that the Council was enabled to accomplish this end. The letters which he had received from Emin Pacha, after a silence of three years, spoke of imminent dangers to the Province, and the urgent need of relief.

Emin Pacha, having been abandoned by the Egyptian government, but still holding loyally to the post to which he had been appointed, and to which he was endeared by many years of self-sacrifice, had exhausted his own supplies, and was in need of ammunition, among other things, for the effective support of his administration. He was threatened by enemies outside, and by starvation and treachery inside, his fortified posts on the Nile. In a letter to Dr. Schweinfurth, dated 31st December 1885, he said :—

"I shall hold on as long as I can, and only in the greatest extremity concentrate all my people on Wadelai. If no news or orders come from Egypt [none had come for four or five years], I shall be compelled to try and send the Egyptian officials and officers to their homes by the south. . . . We sit here, exactly as if at the North Pole, and every expectation of a relief expedition is wanting. Let it be so! Till now I have been able to keep my handful of people together, and in fair discipline. We have now found a way to supply ourselves with the most necessary things; and that will give the people some courage. I must, at least, give them every credit for good service and obedience, notwithstanding the want of everything: nearly naked, without pay, it is certainly more than could be expected. . . . By exerting the greatest care, our ammunition should last for another year. We have just had the good fortune to crush a combined revolt of the Dinka and Bari, after much bloodshed. Should such revolts occur again, and our ammunition come to an end earlier,—what then? I am consequently doing my best to keep open a way of retreat to the south."[1]

Retreat by the south was, however, only to be regarded as a last resort, in case Emin should have found it necessary to evacuate his province. No man better than he knew the value of maintaining, in the cause of civilisation and humanity, even the semblance of a European government in the very heart of the Súdan, the Province having a strategic value second only to Khartúm. Therefore, as he was prepared to continue his work, even at the risk of his life, which he did not value, he asked through Dr. Felkin that the people of Great Britain should open up for him a route to the East Coast, by which he might receive supplies and support from Europe. Such an appeal could not fail to move a generous people, and, once it was made widely known, it was most sympathetically responded to, not only by the British public, but even by the Egyptian Government itself. The British Foreign Office gave its moral support, but refused to recognise its responsibility for the critical position of Emin Pacha.

It is necessary to recall these conditions, which gave rise to the expedition being sent out for the relief of Emin Pacha, in order to appreciate Mr. Jephson's narrative, no less than to justify what remarks we may have to make with reference to his criticisms.

In the first place, Mr. Jephson says, in his preface, that Dr. Felkin, Dr. Junker and others, had entirely misled people in Europe as to the true position of Emin Pacha and the loyalty of his people. We have only to remark, in regard to the paper Dr. Felkin published in the Society's *Magazine*,[2] and to what the Society made public at the time,

[1] *Scottish Geographical Magazine*, vol. ii. page 749.

[2] Vol. ii., page 705. Dr. Felkin's account in the *Graphic* of 29th January 1887 (referred to by Mr. Jephson) does not materially differ from this paper.

that, judging from Mr. Jephson's own narrative, his charge as regards Dr. Felkin or ourselves cannot be substantiated. We cannot always judge African affairs by European standards. The Súdan, more than any other part of Africa—which is saying a great deal—is the grave of all European political reputations: indeed, it is a bottomless pit in this respect. Emin Pacha took over the government of the Equatorial Provinces at a time when, after the return of Baker, Gordon, and Mason, two Egyptian governors had allowed the country to relapse into anarchy. In the space of a few years, instead of the usual annual deficit, the provinces under Emin's rule returned a handsome surplus to the Khartúm exchequer. This result was achieved without any support from Khartúm, and would seem to argue an administrative ability superior to any of Emin's predecessors. But, in spite of the relative success of his efforts, he was handicapped in every way. The officials sent to him by the Egyptian Government were, for the most part, criminals and blacklegs from Khartúm, and Emin himself had only a nominal or restricted power over them. Some of his subordinates, for instance, were of higher military rank than himself until Gordon created him a Bey. Moreover —and this was of the utmost significance—Emin had not the power of life and death: all death-warrants had to be signed at Khartúm. Even administrative measures of grave import had to be first submitted to Khartúm. Considering that Emin was cut off from Khartúm, and shared an undue reverence for red-tape, he was unable to act with promptitude or vigour. And yet, with the worthless materials with which he had to work, he—alone and unaided—achieved results that have never been surpassed in the history of European intercourse with the Súdan. Successive Egyptian administrations in the Súdan, having been based upon corruption and self-interest, have fallen to the ground. Every European officer who has been intrusted with the supervision of, or supreme control over, these provinces, has, in the end, either lost his life or been forced to relinquish such a hopeless task as governing through Egyptian agents. Emin Pacha was the last to try it, and the last to fail.

We may now present Mr. Jephson's evidence in the above respects.

On his journey north with Emin Pacha from M'swa, the most southerly station of the province, on the western shores of the Albert Nyanza, as far as the disaffected regions beyond Laboré and Muggi, Mr. Jephson's narrative shows that a certain military discipline and a fairly effective administration did actually exist. But to the north of these stations the 1st Battalion and the rebel officers, at the time of Mr. Jephson's visit, held the field.

"On my expressing great surprise at the whole affair, Emin told me more fully of the trouble he was in about his soldiers of the 1st Battalion at Rejaf. The story was as follows:—

"Nearly four years before, after the repulse of the Mahdi's people by Emin's soldiers, he wished to abandon all the northern stations of Makraka, Lado, and Rejaf, and concentrate his people to the south, in order to open a road to Zanzibar. He built a station at Wadelai as his headquarters, and established Tunguru on the lake The soldiers of the 1st Battalion, however, refused to move, and were

further instigated to rebel by an Egyptian officer, another of those concerned in Arabi's rebellion, who said he did not believe that the Government at Khartoum had fallen, and that their Governor was deceiving them. He added, 'Why should we be afraid to oppose Emin Pasha, when we in Egypt were not afraid to rebel against the Khedive himself?'

"The result was that the soldiers declared they would no longer obey their Governor's orders, and openly rebelled against him. An insulting letter was sent to Emin, signed by all the officers and clerks belonging to the 1st Battalion. Shortly after this, two attempts were made by a certain Ali Aga Djabor, a Soudanese captain of the 1st Battalion, to capture Emin, and carry him off in chains to Rejaf. Since that time the 1st Battalion had defied their Governor, and had from time to time sent him insulting letters. Some of the Egyptian and Soudanese officers established themselves in Makraka and the countries round, where they led the lives of bandit chiefs, and treated the natives with great cruelty.

"The 2nd Battalion declared themselves loyal and faithful to their Governor, and Emin told me he trusted the soldiers implicitly, and was sure of their obedience to his orders. At the same time, he said there were certain officers of the 2nd Battalion, chiefly Egyptians, whom he knew were unfriendly to him.

"He spoke very strongly about the Egyptian officers and clerks, of whom there were some fifty-six in the Province, and complained bitterly of the policy of the Egyptian Government, which had turned his Province into a sort of Botany Bay, to which all the scum of Egypt had been banished. By his showing, there was scarcely an Egyptian in the Province who was not at that moment undergoing a sentence of banishment from Egypt for such crimes as murder, rebellion, or highway robbery.

"This was a very great revelation to me, for though we all knew, from what he had told us at N'Sabe, that things were somewhat difficult in his Province, we had no idea that rebellion had taken such a hold on his people. I was further surprised that Dr. Junker, who was in the country when the rebellion of the 1st Battalion broke out, should have said nothing about it in Europe. From Captain Casati I got a further insight into things, and felt convinced there would be trouble. He told me that Emin could not, or would not, see how serious the position of affairs in the country had become.

"When Suliman Aga returned to the station, I sent for him, and spoke to him about leaving the country. He said, 'Where the Pasha goes, my soldiers and I follow': he put his two hands together so as to form a circle, and said, 'These are my soldiers, and the Pasha goes in the middle, that is the way we will travel, by whatever road the Pasha wishes.'

"He spoke of what had happened in the station during his absence, and said what an endless source of trouble the Egyptians, and particularly the clerks, had ever been to the Governor, but he said their ideas by no means represented the ideas of the Soudanese, who were dead against them" (pp. 43-45).

Symptoms of incipient rebellion in Emin's province were, nevertheless, known to exist by all those who were at all familiar with the Egyptian Súdan in general, and with the Equatorial Provinces in particular. Emin himself, in his letters to Europe, had frequently alluded to this danger, which, during the time taken by the Expedition to reach the Province, had developed into more serious proportions. It will be remembered that Mr. Jephson, besides acting as Mr. Stanley's herald, was

the bearer of a letter from the Khediv of Egypt to the people of Emin's province. In this letter his Highness said:—

"I give to you, to your officers and soldiers, full liberty to rest where you are, or to do your best to come out with the Expedition which is now sent to you. Our Government has decided to pay you and all the employés, officers, and soldiers, all the appointments and allowances due to you. If, however, any officer or soldier wishes to rest in the country, he is free to do so, but he does so on his own responsibility, and must not expect any assistance from the Government" (p. 46).

Without irony it may be remarked that, had all Emin's people availed themselves of the Khediv's munificent offer, the total amount of salaries due would have been as much as £350,000. The value of the Government ivory in the Province was, however, estimated at £112,000. Moreover, no mention was made by the Khediv of subsequent employment. What were the people to do when they arrived in Egypt? They were comfortable where they were, under a patriarchal and benevolent Governor, and had wives and families who could not be expected to survive the trials of a long march. Mr. Jephson reproduces the following views of Emin Pacha:—

"From the first Emin had said that the Khedive's letter would have a bad effect on the people, he ought to have *commanded* them to go to Egypt instead of leaving them to decide for themselves. It was a pity, too, when it was decided that the Expedition was to be sent, that some of these people's relations in Egypt should not have been invited to send letters by us to their friends here. This would have at once put an end to their doubts as to our connection with Egypt" (pp. 153-4).

These doubts were genuine enough, as the following passages prove:—

"We arrived at Laboré on August 12. . . .

"On the day after our arrival, I went up to the station with Emin to speak to the people before leaving for the south.

"I read the Khedive's and Stanley's letters, and explained as usual everything connected with the Expedition. Whilst I was speaking I noticed that the soldiers were not as attentive as was generally the case, and that there was a good deal of whispering going on amongst them. A large crowd of people, too, men, women, and children, had gathered in dense masses on a little bluff, above the place where the soldiers were drawn up in line, and there was an uneasy stir amongst them, as if something unusual was going to happen.

"After I had finished speaking, Emin, as was his custom, added a few words to what I had said. Whilst he was speaking, a big bull-headed, sullen-looking Soudanese stepped out of the ranks, and exclaimed, 'All you have been telling us is a lie, and the letter you have read out is a forgery, for if it had come from Effendina [the Khediv] he would have *commanded* us to come, and not have told us we might do as we pleased. You do not come from Egypt; we know of only one road to Egypt, and that is by Khartoum: we will either go by that road, or will live and die in this country'" (pp. 145-6).

This was, in fact, the beginning of the end. The spark of the conflagration had been struck. It is quite reasonable to assume that, on the part of the Sudanese, there were grave doubts as to the real meaning of

the evacuation of the Province. They really did not believe that Khartúm had fallen, whilst their ignorance of the geography of Africa led them to suppose that there was but one way to Egypt, and that that was by the Nile. Of course there was no dealing with such stupidity, as Mr. Jephson acknowledges:—

"Here was Hawashi Effendi, one of the most intelligent of Emin's people, still half-believing that the news of the fall of Khartoum was false! He had seen Stanley at N'Sabe, and had heard from him all about the affairs in Egypt, and yet he could not divest himself of the idea that Egypt still governed at Khartoum. The stupidity of these people was maddening; it was like talking to a brick wall; and it was impossible for a European to understand their way of arguing and thinking. As Mrs. Poyser says, 'You must be a bat to know what the bats are flying after'; in the same way, one must be an Egyptian or Soudanese to understand the working of their minds" (p. 116).

Even the authenticity of the Khediv's letter was at first doubted by the rebels; but by most of them it was subsequently regarded as genuine. Moreover, it was scarcely surprising that the bulk of Emin's people should have discredited the benevolent intentions of Mr. Stanley's Expedition; and they had no faith in its strength. Instead of an imposing army, accompanied by a few Egyptian Pachas in smart uniform, all they saw to sustain Mr. Jephson's assurances was a young man in a travel-stained suit. Nevertheless, before the rebellion had taken hold upon the entire Province, the bulk of the people appeared quite willing to follow the fortunes of their Governor. After addressing the garrison at Tunguru, Mr. Jephson, who on such occasions knew well how to assume the *rôle* of a commissioner with delegated powers, called in all the people, to hear their decision:—

"First came Suliman Aga, the head of the Regular soldiers at Tunguru, and chief of the station: he brought with him his lieutenant and six non-commissioned officers. I further explained to them that the evacuation of this country would not be an easy thing, and that they would have to work hard on the road if they came out with us. I then asked them if they wished to go to Egypt; to which they replied, they had talked it all over amongst themselves, and had decided if the Pasha stayed, they stayed; if the Pasha went, they went. Ibrahim Aga, the chief of the Irregulars, next came in with his non-commissioned officers, and to my question as to whether they wished to go to Egypt or not, they returned the same answer as the Regulars had given me. These people came from the country round about Dongola, and were the most useful of Emin's people. Then followed the clerks and civil employés, who gave me precisely the same answer as their predecessors.

"It was plain to me, therefore, that the feeling of these people was not for going to Egypt" (pp. 51-52).

Again, at Wadelai:—

"They all said, as the people at Tunguru had said, 'We will follow our Governor; if he goes, we go; if he stays, we stay'" (p. 75).

"I again, therefore, had the Soudanese officers and non-commissioned officers up before me, and, speaking to them, said, 'From what I have heard from certain

officers, I understand that it is not your wish and that of the soldiers to go to Egypt, but to follow us with your Governor to a country somewhat nearer the sea, and there to settle down. Is this your wish?' I was answered by a deafening 'Aywah' from all.

"This answer was conclusive. The feeling was evidently against going to Egypt.

"The Egyptians, Circassians, and Khartoum people, however, naturally wished to return to Egypt, where most of them had relations and friends" (pp. 75, 76).

We know also that Emin Pacha himself said to Mr. Stanley, over and over again, that, if his people desired to leave, he would leave with them; if they stayed, he stayed. Such reiterated statements showed mutual confidence, no doubt, but, not being followed by action, were very exasperating to those who had no desire to spend a longer time in Africa than was absolutely necessary. The only excuse that can reasonably be made is that there was great difficulty in arriving at an unanimous decision at a time when the Province was weakened by want of any material outside support, which gave opportunities to all the factious spirits to intrigue for their own selfish ends. If Emin Pacha had had some show of power to back his authority—as, for instance, an advance force from Mr. Stanley's Expedition—he might have been able to carry through any programme that was deemed desirable for the good of the Province. But he was alone, and had nothing but assurances to give. His indecision arose from the faults of his virtues: it was the battling of a noble mind to fulfil the measure of his self-sacrifice. He should not be blamed for such an attitude. History presents other precedents of a short-sighted people failing to recognise their benefactor. Mr. Jephson, in the following extract, gives a pathetic picture of Emin Pacha's actual position:—

"I pitied Emin terribly, he was worn out by years of residence in the Equatorial Province, with all its unceasing anxiety. He had stuck to his people, and had repulsed the Mahdi's attacks unaided by the outside world, and now for the last three years the trouble of rebellion had been added to his other anxieties. He told me he was perfectly worn out by it all, and would gladly lay down his burden, 'But,' he said, 'who will take it up?'

"I had a long talk with him that night, and I felt ashamed, as I listened to his story, that I had been so irritated by his want of promptness two days ago. It is difficult for a young man, full of vigorous life, to understand how hard it must sometimes be for an elderly man, worn out in body and mind by long years of hard work and anxiety, to act with energy and promptness.

"Emin had been over ten years in the Turkish service as a surgeon, and most of that time, he told me, had been spent in very hot climates, such as Syria, and different parts of Asia Minor, Armenia, Persia, Arabia, and Tripolis. After that he had entered the Egyptian service, and had been in the Equatorial Province for thirteen years, the climate of which is most trying to Europeans, and for the last eight or nine years had had all the responsibility of the Government on his shoulders. During the first years of his governorship, he had seen, with despair and indignation, all his best efforts for the good of his Province and people checked and ruined by the shameful policy of the government at Khartoum. For the last five years, since he had been cut off from the outside world, it had been all he

could do to hold his own against the troubles which beset him, and to clothe and look after the people under his care, a people who seldom showed any gratitude. He was in such a state of nervous exhaustion, that he seldom got more than two or three hours of sleep at night, and his heart gave him great pain and anxiety.

"It was only at times when the troubles of his Province, his sleeplessness and anxiety about his work, combined to make his burden seem almost heavier than he could bear, that he gave way to melancholy, and to a feeling of despair, as to who would take up his work should he be obliged to relinquish it.

"But such fits of melancholy never lasted long, and, as a rule, he was cheerful and busy. His one recreation was in his ornithological researches, for which he had a great passion. His collectors went out daily and brought him in many rare kinds of birds, and in his leisure time he might be seen measuring and classifying his specimens, with all the fresh interest of an ardent ornithologist. A brave man, who bore up against his trials, and unhesitatingly gave up the best years of his life for the good of his people, beset with troubles from within and without,—he must always be, to any one who had seen him in his country and known him, an object of admiration and sympathy; whilst his kindness of heart, unselfishness, and generosity ought to make those who knew him intimately sincerely attached to him.

"I shall never forget that night, when we sat together till morning broke, talking of many things and of the turn affairs in his Province were, I felt, too surely taking. He told me of his life, of his hopes and fears, his struggles and disappointments, and all with a simple earnestness which touched me with remorse when I thought how often I had allowed myself to be irritated by his want of energy and decision" (pp. 111-13).

Further on Mr. Jephson says:—

"Poor Emin, he was utterly beaten down by the weight of his troubles, his bitterest thought was that after all these years of self-sacrifice on his part to his people, they should so turn against him, and that his control over them should be so slight. All Emin's immediate people, his secretaries, clerks, aides, and followers had been put in prison, and we were alone, utterly alone, with absolutely no one in whom we could place the slightest confidence. He was one of those brooding, susceptible natures, and his thoughts at that time must have been torture" (p. 171).

And yet, in spite of the indisputable evidence which we now possess in regard to a life of entire devotion, self-effacement, and unceasing benevolence led by Emin Pacha in Central Africa, there are people who rail at him for his want of firmness! For over ten years he held his people together; he fed them and clothed them and ruled them with a gentle hand: out of chaos he created what in the Súdan may be called law and order. He was surrounded on all hands by rascally Egyptians, who lived but for their own selfish ends; and he was practically isolated in the world as regarded all those agencies which nourish the intellectual faculties. Taking into account the mental and moral culture of Europeans resident in other parts of Tropical Africa, and contrasting the experiences of Emin Pacha with those of other Europeans in those regions, the marvel is that this man could have accomplished what he has done. If he had been able to stand alone, the very need of a relief expedition would not have arisen. And, after all, the discipline of his people compares

favourably with that of the much-abused "rear-column" of the Relief Expedition. Even though they were rebels, they at first conducted their affairs with at least a show of justice and order. Mr. Jephson says:—

"It was curious, that while these people were proposing the most diabolical plots of cruelty, robbery, and disorder, they still clung to a semblance of decency and order, and tried to justify each other in what they were doing. People may not be able to understand this strange combination. I can only say it was so."

Yes, and, being so, it must have been the result of an ingrained discipline. The rebel council was composed of sixty or seventy officers, clerks, and *employés* from every station in the Province. Most of the officers were Sudanese (Arabs), but the clerks were chiefly Egyptians, Copts and Khartúm people. What, then, was the true cause of the rebellion? Mr. Jephson tells us in more than one place:—

"He [Hamad Aga, a Sudanese] deplored the influence the Egyptian officers and clerks had always exercised in the country, and said that the whole of the mutiny againt the Governor in Rejaf had been stirred up by an Egyptian officer, a certain Mustapha Effendi, who had been sent up to the Province for being concerned in Arabi's rebellion. He spoke very highly of Emin, and said he had always been most self-sacrificing to his people, but that he was not firm enough with them" (p. 69).

"In the evening, Selim Aga came in to see us, having been with Fadl el Mulla and the chief mutineers for a couple of hours. He told us that the prime mover in the rebellion had been Achmet Effendi, the clerk who had gone and complained to Stanley about Emin, and who had afterwards been imprisoned at Dufilé for spreading sedition in Tunguru. It appeared he had written to Fadl el Mulla, the chief of Fabbo, circulating lies about the Expedition, and when he heard that the ammunition had been moved from Muggi, and the commencement of the evacuation of that station begun, he had at once written to Fadl el Mulla, and asked him to act.

"Fadl el Mulla told Selim Aga that one of the chief reasons for the rebellion was that for a long time a strong feeling against Hawashi Effendi, the senior officer of Emin's forces, had been growing among the soldiers and officers. Many complaints had been made to Emin about his grasping and overbearing conduct, but had always been disregarded, and Hawashi Effendi had continued to be the chief of the soldiers.

"Another reason was that they thought that there would be an attempt on the part of their Governor and Stanley to compel them to leave the country. They would not be able to carry their women and children and goods with them; moreover, they knew nothing of a road to Egypt *viâ* Zanzibar, and did not really believe that Khartoum had fallen. A variety of minor accusations were brought against their Governor. Everything, in short, might be summed up in an accusation of treachery on his part to the Khedive and his people, and injustice to his officers. All expressed a strong feeling of dislike against Signor Vita, the apothecary, who, they said, acted as a spy for the Governor, and made a great deal of mischief in the Province" (pp. 163-4).

The charges which the rebels made against Emin were, of course, unfounded. After detailing some of these, Mr. Jephson adds:—

"The rest of the accusations referred chiefly to neglect of, and injustice to, his people, of favouritism, and the taking of presents. All of these accusations were equally outrageous and absurd" (p. 214).

And further on he says :—

"Certain it is, that had the rebel officers been able to prove a single instance of injustice and irregularity against Emin, he would most assuredly have lost his life during those first excited weeks of the rebellion. But they could prove nothing, for Emin was found to be perfectly innocent of any of the many accusations brought against him" (p. 289).

Emin's chief accusers were, of course, the Egyptian clerks, who had stirred up all the mischief in the Province. The following is Mr. Jephson's opinion of Emin's people :—

"I could not see one redeeming quality about them ; they, who were only natives themselves, looked down on the other natives who were not 'soldiers,' and they treated them with the utmost arrogance. They were ill-mannered and insubordinate, and, in spite of their ignorance, gave themselves the greatest possible airs, and talked about being soldiers when they did not know even how to obey. I have no hesitation in saying that, as a body, I have never seen a more useless set of men. It was not altogether Emin's fault, for he had a miserable lot of corrupt officers under him, most of them being criminals" (p. 283).

Had Emin shared his views, it is to be feared that he would not have persevered in his self-denying task. But probably Mr. Jephson would have treated the people differently, as may be inferred from the following passage :—

"The truth was, Emin spoilt his people ; he was too easy and good to them, and such goodness was not, I think, real kindness, for it only made them more and more absurd in their pretensions.

"I remember when we were at Kirri, Emin's coming to me and telling me that we must leave the station, for his orderlies had nothing to eat. 'But,' I asked, 'is there no corn in the station?' 'Corn! There's plenty of corn, but they have got no women to grind it.' 'And do you mean to say, Pasha, that your orderlies, who have nothing to do all day long, cannot grind their own corn for a few days?' He answered, 'You don't understand the customs of the country : such a thing is not done.' I shrugged my shoulders, and said, 'Very well, Pasha, but I should like to see any of our Zanzibaris coming up to Stanley with such a complaint, even after they had been carrying ammunition to help your soldiers all the day.' Such spoiling was not kindness ; it ruined the soldiers, and made them useless for anything" (p. 285).

The above anecdote deals with an extreme case. But elsewhere in Africa we see that the disregard of native customs and prejudices is fatal to all influence by Europeans. Witness the failure of Germany to implant her rule on the East Coast. Mr. Jephson's judgment is, however, more deserving of our commendation in the following paragraph :—

"They were a horrid lot, these people of Emin's, and it was like a nightmare being with them. There is no atmosphere so appalling as the atmosphere of treachery. The hopeless feeling of not being able to put your hand on one person and feel he is to be trusted ; to have every word and action twisted and misconstrued by those for whose good alone you are thinking and working! The whole story of the loss of the Soudan is one of treachery. I could understand better now what Gordon must have felt when he gave up his life for the people for

whose liberty he had fought and struggled so long, only to find himself distrusted, and every action and endeavour for their good turned against him and misunderstood" (pp. 189-90).

Our own regret is that Mr. Jephson and others cannot apparently apply the same reasonable judgment in respect of Emin Pacha. Even the Negro, according to him, is capable of chivalry: —

"'Chivalry in a negro!' I hear some people say in a tone of contempt, and I answer, 'Yes, chivalry in a negro, as chivalry in a European.' It may not wear quite the same form as ours, but for all that it is chivalry of the truest kind. Touch that string, strike that cord, and you will be answered by as true a strain of melody as ever you could draw from a European" (p. 180).

And perhaps it was this chivalry upon which Emin Pacha relied for support? Or was it simply the knowledge of performing a noble work that sustained him in his hours of misgiving? Certain it is that no man has done more than Emin Pacha to make the name of a European respected in Africa. His hour of triumph, even in the moment of defeat, was not denied him:—

"On the morning of November 17th, Emin was released from prison, and was formally escorted down to the steamer by most of the officers. He had been in prison just three months, during which time he had never been outside the high walls of the compound.

"The farewell which Emin received was a triumph over his enemies. The soldiers were marched down to the landing-place, and the Khedivial Hymn was played. They were all drawn up in two lines on each side of the road, and saluted as the Pasha passed between them. Salutes were fired from the mountain guns, and the whole station, with the exception of a comparatively small party of officers and clerks, turned out *en masse* to greet him and wish him God-speed.

"Every one seemed to breathe more freely now that he was at liberty again. Nearly all came and kissed his hands, and conducted him in triumph to the steamer. His own flag with the crescent and three stars, which he was allowed to fly as Governor, was flying at the fore, and two flags aft, as before the rebellion.

"At 7.30 A.M. we steamed away from Dufilé, amid loud-spoken expressions of good-will from every one. As for Emin, he was in tremendous spirits. He seemed never tired of looking at the trees, the water, the mountains; the feeling of being at liberty again made him restless and excited. We talked of the probability of the Donagla [the Mahdists] taking Dufilé, and the unlooked-for turn of fortune's wheel, which had given us our liberty. We looked back at Dufilé, now growing indistinct in the distance, the station in which we had such extraordinary experience, until a bend in the river hid it from our view. Thank the good God, that was the last we saw of it!" (pp. 289-90).

After Emin's return to Wadelai, Mr. Jephson made the following entries in his diary:—

"Every one seems glad to have him back, and the utmost contentment apparently prevails. The few faithfuls who have stuck to him, in spite of threats of imprisonment or death from the rebels, go about with grinning faces, showing the height of their delight that the bad days are over. The Pasha's return here is decidedly triumphant. I do not think the people actually against him were in the

majority, but the rebels acted so promptly and quickly, that the people were cowed and astonished, and for a few weeks were completely taken in by the lies the rebels circulated about the Mudir. They therefore passively allowed the rebels to do as they pleased, as all negroes will in the face of determined energy, and acquiesced in all that was done. Then they heard the news of the coming of the Donagla, and the people were greatly startled and astonished to find that Khartoum had actually fallen, and that there was no road that way. Then they saw that the policy which the Pasha had for the last three years been alternately commanding and entreating them to pursue was right, and they understood how completely they had been befooled by their officers, and how foolish they had been in throwing over the Mudir when such a crisis was at hand" . . . (pp. 292-3).

"For six or seven days we heard nothing: things at Wadelai were going on comfortably and quietly. Emin was busy with the sick, and ineffably happy in his liberty, and in the feeling that he could again be at work among his people. The forced inaction of his trying imprisonment had been one of the hardest things to bear, and he was never so happy as when going about at Wadelai and tending the sick. Nothing seemed to tire him, and nothing concerning the welfare of his people was too much trouble. He seemed quite to have forgotten and forgiven all that they had done to him, and thoroughly believed in their renewed protestations of loyalty. I was more sceptical about it all; but I was different, for I did not love his people. To this day I am certain they were really glad to have him back, only it meant nothing, for I knew that if anything happened, we could never rely on them to help us in the smallest degree.

"However, those few days following his release were very happy ones to Emin; the station was quiet, and the soldiers well behaved" (p. 297).

Our readers may be left to draw their own conclusions in regard to the quoted passages from Mr. Jephson's volume. We do not think that they will show Emin Pacha in an unenviable light. Were there more men of his calibre in Africa, the task of Europe would be a light one indeed. It appears to us, not having had the experience of Mr. Jephson, that the fall of Emin Pacha will be fraught with more disastrous issues to the Súdan than any single event that has previously occurred in that unhappy region. And it was to maintain Emin Pacha in his position that the Council of the R.S.G.S. used its best influence to promote a Relief Expedition.

A. Silva White.

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## GEOGRAPHICAL NOTES.

### EUROPE.

**Ben Nevis Observatory.**—A few years ago there was not a single high-level meteorological observatory in the United Kingdom. This want became the subject of discussion in 1877, when the late Mr. Milne Home suggested Ben Nevis as a suitable site, being the highest summit in these islands (4,406 feet) and in the track of the south-west storms from the Atlantic. On October 17th, 1884, a permanent observatory was opened, and placed in charge of Mr. Omond, of Edinburgh. The observations carried out under his superintendence, and recorded every hour in the twenty-four, have been most instructive; but Dr. Buchan pointed out that their value would be greatly enhanced by comparison with a companion set

taken at the sea-level, whereby the condition of the intervening stratum of air, which must have an effect in checking or accelerating atmospheric disturbances, might be clearly ascertained. With the help of a grant of £1000 from the committee of the Edinburgh Exhibition, an observatory has been erected on the shores of Loch Linnhe, and has been furnished with instruments by the London Meteorological Society. It is connected by telegraph with the one on the summit, and is now in full working order, under the charge of Mr. Rankin, Mr. Omond's assistant.—*The Times*, September 10, 1890.

**Hypsometrical Map of Russia.**—This map, constructed by Major-General A. v. Tillo, is described in *Petermann's Mitteilungen*, Bd. 36, No. vi. It is on the scale of 1 inch to 60 versts, or nearly 40 miles (1 : 2,520,000), and embraces Russian Europe from the 61st parallel of north latitude down to, but not including, the Caucasus. For the northern part sufficient data are wanting, and the Caucasus is to be represented in a separate map, its mountainous character requiring a different arrangement of contour lines. In the present map the contour lines are drawn at intervals of 10 sazhenes (1 sazhene = 7 feet) up to 100, at intervals of 20 up to 200, and at intervals of 50 up to 700 sazhenes. Different colours also are employed to render the differences of altitude more conspicuous. General v. Tillo obtained his data from the *Catalogue of the Trigonometrical Points of the Topographical Department of the General Staff*, the *Zapiski* of the same department, the Military Topographical 3-versts map, the excellent manuscript map of Kurland by Colonel Strauss, the maps of the new survey of the western frontier districts, etc. Only in the outlying districts of the vast Russian territory are there any elevations rising to a height of more than 1400 feet. The sources of Russian rivers seldom lie higher than 650 feet, and most of them considerably lower. The elevated districts which extend from the Valdai Hills almost to the Sea of Azov, along the Volga, and from the Dniester and Dnieper to Warsaw, and the mountainous district of the Urals are strikingly depicted in the black and white copies published in the *Izvestiya*, tome xxv. part 1, in which the country rising above 210 feet is left white.

## ASIA.

**Central Asia.**—Colonel Pevtzov's expedition broke up its winter quarters at Nia on April 24th, and marched towards the Ijelik-Khanum Pass, leading into Tibet. The month before, Lieutenant Roborovsky, a member of the expedition, made an excursion to Cherchen, along the edge of the desert, which is marked by a broad belt of poplars. To the north, and in the direction of the river Tarim, extend sandy wastes, into which the natives themselves do not venture to penetrate. The route to Cherchen is crossed by five streams which, after short courses, lose themselves in the sand.—*Petermann's Mitteilungen*, Bd. 36, No. 9.

Captain Grombtchevsky has met with great difficulties in Tibet. *Globus*, Bd. lviii., No. 9, reports that he was stopped at Pola by Chinese soldiers, and was ordered to return to Kashgar. Though, however, the expedition was in a very critical position, all their own resources having been exhausted as well as a considerable sum of borrowed money, the leader could not make up his mind to abandon the enterprise, and, breaking up his camp on the night of May 16th, plunged into the recesses of the untrodden mountains.

**Chinese Emigrants.**—Count H. Meyners d'Estrey has given, in the *Revue de Géographie*, July and August 1890, some interesting information concerning the tribes to which the bulk of the Chinese emigrants belong. The home of these people is the province of Quang-tung, of which Canton is the capital. The autochthonous

inhabitants were driven out many centuries ago by an influx of emigrants from the west, and are now to be found only in the recesses of the mountains of Quantung and Quang-si, under the name of Miau-Tsze. Their territory was occupied by the Punti, who in their turn have been partly dispossessed by the Hoklo, a people from the province of Fo-kien, the southern part of which is still called by its inhabitants Hok-lien. This people now predominates in the department of Chow-chu, except in the district of Ta-pu, and in several of the districts of Whei-chu. About the same time, that is, in the Middle Ages, another stream of emigrants descended on to the country of the Punti, namely the Hakka, whose origin is unknown, but whose dialect bears a marked resemblance to those of Northern China. They occupy the district of Ta-pu, the department of Kia-ying, and, to a large extent, the districts of Whei-chu which are not in the possession of the Hoklo. The name Hakka signifies "strangers" or "immigrants," but it has now been adopted by the Hakka as the designation of their tribe. Having been for centuries accustomed to a nomadic life, and having been continually compelled to struggle for existence while they crept in, by individuals or families, among the races whose property they have gradually appropriated, they have acquired an enterprising disposition, a habit of patient endurance, and resignation in misfortune. Active and laborious, and working under a Tropical sun as well as in a Temperate clime, they are peculiarly suited to the work of colonisation, either as traders or labourers. Without their assistance it would have been impossible to have worked the tin mines of Banka and Billiton, and to have constructed railways in other parts of the Dutch East Indies, the natives being far too indolent to undertake such labour. Their women also, far different from those of other Chinese tribes, work in the fields, and are as laborious as the men. In Borneo the intelligence and indefatigable industry of the Hakka have produced the most striking results. They have cleared large tracts, built towns, and worked mines without any support from their native country, protection, or capital. They are on better terms with the Malay sultans than the representatives of Holland, and pass freely through the territory of the Dyak tribes, where a European dare hardly venture though armed to the teeth. The Hoklo are also remarkable for their intelligence and energy, and likewise emigrate, but in fewer numbers. Both tribes continue to thrust themselves in among the unfortunate Punti in the province of Quangtung, and, when in any district they are nearly as numerous as the Punti, dissensions arise, and open riots take place. Count d'Estrey looks upon the system of village communities prevailing in China as indirectly contributing to the success of Chinese colonists. The inhabitants of a village bear the same name, being no doubt of the same family. Each village is autonomous, and its autonomy is recognised by the Chinese Government, centralisation being almost impossible in so extensive an empire. Consequently, each member of the community is treated by the others as a relation, receives assistance in case of illness, and is supplied with food and shelter when out of employment. These customs are equally observed by Chinamen in foreign countries, so that the emigrant finds assistance in a new country from members of his clan already established there. On the other hand, this system fosters party spirit, and promotes antagonism between different villages. Its effect, however, is partly modified by the custom of taking a wife from another village. In foreign countries the Chinese intermarry with the natives, and thus secure a footing among them.

**Malaysia.**—*Petermann's Mitt.*, Bd. 36, No. viii., gives a few notes on the expedition which Professor M. Weber, of Amsterdam, made in the Dutch East Indies during 1888-89, accompanied by Professor A. Wichmann, of Utrecht. Flores and

Celebes were the goal of the expedition, but, before proceeding thither, Professor Weber landed in Sumatra, where, though the ground has been often searched by naturalists, he discovered several varieties of animals hitherto unknown. In Flores and Celebes he collected data for the purpose of determining the boundary between the Indian and Australian faunas. The species he selected for observation were the land molluscs, as being less capable of migration than the birds, butterflies, and beetles chosen by Wallace. The two professors worked together in Flores until the west monsoon set in, when Wichmann left for Larantuka and Timur, while Weber explored the Luvu country around the Gulf of Boni. On both islands the inhabitants of the coast are of a very different type from the people of the interior. Whereas the dwellers on the coast of Flores are smooth-haired and have intermingled with foreign races, the mountaineers have strong, curly hair, are much more sturdily built, and have fine voices of different pitch, a distinction never perceptible among the Malays. They are active and lively, and have many points of resemblance with the natives of the Aru, Kei, and Tenimber islands. Professor Gerland therefore made a mistake when he included Flores in the western group.

## AFRICA.

**East Africa.**—*The Times*, October 29th, contained the following paragraph, in which the Berlin correspondent explains the relations between the German Government and the German East Africa Company :—

"It is now semi-officially admitted that an agreement has been come to between the Imperial Government and the East Africa Company, whereby the latter cedes all its territorial and sovereign rights to the Empire, as well as the right of levying customs, in return for a yearly percentage. Out of this annuity the Company, among its other burdens, will have to pay the interest on the sum of four million marks to be granted to the Sultan by way of compensation for his surrender of the mainland ; and the Company, which has also to raise and afterwards redeem this loan, is now engaged in the effort to procure the money.

**Population of Africa.**—Mr. E. G. Ravenstein has recently made a new estimate of the population of Africa, which hitherto has been regarded as upwards of 200 millions. The following tables are taken from *The Development of Africa* (Silva White) :—

| | Area. English sq. miles. | Population. | Inhabitants to a sq. m. |
|---|---|---|---|
| Morocco and Tuat, | 314,027 | 6,076,000 | 19 |
| Algeria, | 257,600 | 3,870,000 | 15 |
| Tunis, | 44,800 | 1,500,000 | 33 |
| Tripoli, | 400,000 | 1,010,000 | 2 |
| Sahara, | 2,386,000 | 1,400,000 | 0·6 |
| Egypt Proper, | 436,000 | 6,970,000 | 16 |
| „ Old Dependencies, | 685,000 | 7,162,000 | 10 |
| Abyssinia, | 128,000 | 3,000,000 | 24 |
| Galla and Somál, | 732,100 | 3,190,000 | 4 |
| Central Súdan, | 662,200 | 31,880,000 | 48 |
| West Súdan and Upper Guinea, | 770,000 | 14,266,000 | 79 |
| Equatorial and South Africa, | 4,458,700 | 41,818,170 | 9 |
| Islands, | 239,880 | 4,896,200 | 20 |
| | 11,514,307 | 127,038,370 | 11 |

Mr. Ravenstein further estimates the areas of Africa, and the populations they support, to be divided as under :—

| | Area. English sq. miles. | | Population. | | Inhabitants. to a sq. m. |
|---|---|---|---|---|---|
| Under Turkish Rule :— | | | | | |
| Egypt, . . | 436,000 | | 6,970,000 | | 16 |
| Tripoli, . . | 400,000 | | 1,010,000 | | 2 |
| | ——— | 836,000 | ——— | 7,980,000 | 10 |
| European Possessions, etc. :— | | | | | |
| British, . . | 2,351,936 | | 39,289,500 | | 17 |
| French, . . | 2,783,948 | | 21,947,600 | | 8 |
| German, . . | 832,750 | | 5,105,000 | | 6 |
| Italian, . . | 315,070 | | 5,369,000 | | 17 |
| Portuguese, . | 909,820 | | 5,513,900 | | 6 |
| Spanish, . . | 246,760 | | 444,000 | | 2 |
| Belgian, . . | 827,000 | | 15,000,000 | | 18 |
| | ——— | 8,267,284 | ——— | 92,669,000 | 11 |
| Independent, . . . | | 2,120,323 | | 24,595,370 | 11 |
| Liberia, . . . . | | 37,000 | | 1,050,000 | 29 |
| Boer States, . . . | | 173,350 | | 744,000 | 4 |
| Great Lakes, . . . | | 80,350 | | ... | |
| Grand totals, . | | 11,514,307 | | 127,038,370 | 11 |

## AMERICA.

**Venezuela.**—In the *Tijdschrift van het Kon. Nederlandsch Aardrijkskundig Genoot.*, Deel vii., No. 3, Dr. Ten Kate publishes a few extracts from a diary written during his journey from Bolivar, on the Orinoco, to Araya. The country is for the most part dreary *llanos*, where sand-storms and locusts are met with, as on the Sahara. Water is found only in the shallow streams, which flow, in directions approximately parallel, to the Orinoco or the Gulf of Paria, the courses of which may be traced at a distance by the palms (*Copernicia tectorum*, *Mauritia flexuosa*, *Guilielma piritú*, and others) that line their banks. The fauna is poor, consisting chiefly of a few birds and insects. A Carib hunter brought his game for sale—a short-eared rabbit (*Lepus brasiliensis*) and some iguanas. Beyond the Rio Guarapiche the character of the country changes, the path leading over bare sandstone amidst stones and loose blocks. The change in the vegetation is marked by the presence of numerous cactuses, but, as in the *llanos*, bushes are only to be found in hollows, where the ground remains moist after showers. Elsewhere yellow grass and agaves only are to be seen. Crossing the Cuchilla ridge, which, according to Humboldt, attains a height of 3500 feet, Dr. Ten Kate came to El Guacharo, a small hamlet noted for the cave in its neighbourhood which was explored and described by Humboldt. According to Dr. Kate, it is in no respect more remarkable than other stalactitic caves. Its living inmates seem to have interested him more, especially the *guacharo*, a variety of goatsucker (*Steatornis caripensis*). On approaching the coast Dr. Kate enjoyed a charming view of the Gulf of Cariaco and the adjoining

peninsula of Araya, with grey mountain-land full of gullies and ravines in the foreground, and was greatly struck by the varied and harmonious colouring of the landscape. The eastern coast sierra, which formed his vantage ground, attains its greatest height in the summit Turumiquire, estimated by Humboldt at 4500 feet. On the slopes of this range Dr. Kate observed flourishing plantations of maize, sugar-cane, and tobacco, but on the *llanos* the people live poorly, their chief food being cassava bread. At Aguasai Dr. Kate endeavoured to collect some anthropological data respecting the natives, but was not very successful. The original inhabitants, the Chaymas and Cumanagotos, belong to the Carib race, but they have so large an admixture of foreign blood that their original characteristics can hardly be ascertained, and the difficulties of the task are increased by their unwillingness to acknowledge the savage race to which they belong. From the five individuals he was able to measure, Dr. Kate concludes that their average height is nearly 5 feet 2 inches, and that they are subbrachycephalous. Their skin is light-brown or yellowish, their hair raven-black, their eyes dark-brown, and their teeth irregular and frequently decayed. Their expression is generally apathetic and wanting in intelligence, but good-natured.

**Patagonia.**—Sr. Carlos Ameghino, in the *Bol. del Instituto Geog. Argentino*, tom xi. cuad. 1, gives an account of exploring journeys he made up the river of Santa Cruz and the Chubut, in the year 1887. Between Misioneros and Las Salinas he was able to examine superficially the imposing precipitous cliffs which confine the river of Santa Cruz. The rocks belong to the Patagonian marine formation, and may be divided into two groups of very different appearance and petrographical character. The upper strata consist of volcanic detritus of a white or yellowish colour, containing numerous beds of gypsum. About midway between the upper and lower surface is generally to be seen an intercalated zone of clayey limestone, composed almost entirely of oysters and other marine molluscs. The lower strata, which dip down to an unknown depth below the sea-level, are chiefly composed of argillaceous sandstones of a dark-grey colour, enclosing immense banks of marine fossils. Here Sr. Ameghino found several bones belonging to the skeleton of a singular bird allied to one discovered by Sr. Fontana on the Chubut. In many respects similar to the penguins of the present day, it was probably distinguished from these birds by the possession of teeth. But further up the river, where it describes a wide curve at Swamp-Bank, or Rincon Grande, Sr. Ameghino obtained fossils of much greater interest—remains of armadillos, marsupials, glyptodons, *creodonta*, toxodons, rodents, etc. He states that out of 120 species, the remains of which he collected during his journey along the river Santa Cruz, only twelve were previously known to science. The strata in which they were found consist of greyish-green argillaceous sand and whitish volcanic detritus, alternating with sandy layers and stony deposits of lime. Below these appears a marine formation, which Sr. Ameghino maintains is not identical with the formation which skirts the whole coast of Patagonia, seeing that it contains a species of oyster never found in the latter, but is probably of older date. Sr. Florentino Ameghino, the brother of the explorer, considers that this marine formation, and the alluvial deposits resting on it, were formed in Eocene times. Leaving the bank of the river at this point, Sr. Ameghino ascended to the adjacent table-land, and on the fourth day caught sight of the chain of the Andes and encamped beside a small lake surrounded by basaltic rocks, the home of the puma and the condor. The following day he continued his march along a defile of basaltic bulwarks, passing an almost continuous chain of beautiful crystal pools, until he emerged on to a desolate plain, and finally reached the splendid Lago Argentino. On his

return he discovered two other deposits of fossils, and obtained a jawbone of a huge pachyderm, of which little was known before (*Astrapotherium magnum*, Ow.), remains of the *Pachyrucos*, a curious animal a little larger than the viscacha and having much in common with the *Hyrax*, and several other interesting fossils.

In the ascent of the Chubut, Sr. Ameghino was fortunate in being able to join the party of Don Eleazar Garzon, who was engaged in surveying operations. As far as Las Piedras extends the marine formation of the coastal region, but beyond this point appears, as on the river of Santa Cruz, another formation also of marine origin, but of much older date, which attains its maximum development between the Campamento General Villegas and the valley Adolfo Alsina. It is composed of successive strata of sand and clay, exhibiting a variety of bright colours—white, yellow, pink, etc.—and lies either immediately on the porphyry, or is separated from it by grit similarly coloured. After Alsina is passed, the road leaves the bank of the river and follows an old watercourse, thus avoiding the long detour which the river makes to the south along a channel shut in by gigantic and perpendicular walls of porphyry. The Indian inscriptions, found here by Burmeister, Sr. Ameghino believes to be merely meaningless marks and lines, made probably by the deserters after the mutiny of Punta Arenas, in 1879, to while away the time. On arriving at Pichun-Gueyú, the vast central mass of eruptive rocks, which separates the dreary lands of the littoral from the splendid regions of the interior, was left behind, and was succeeded by the extensive sedimentary deposits which occupy the rest of the Patagonian territory, volcanic rocks being visible only in isolated elevations and knolls. These deposits consist principally of fine-grained argillaceous and sandstone rocks, of a metamorphic character, distributed in the most capricious manner and displaying every imaginable colour. The strata lie approximately horizontal, their slight dip striking towards the east. After passing similar smaller valleys the explorer arrived at the Paso de los Indios, where Don Garzon was encamped, and spent several days in wandering about the neighbourhood, where he found a number of stone implements, manufactured by the Indians who in ancient times inhabited this district. On the 11th of October Sr. Ameghino set out again, and crossed the watershed between the Chubut and the Teca, over a chain of mountains running about NNW. and SSE., with summits nearly 4000 feet high. At the foot of the cordilleras of the Andes he reached á river, which he supposed to be the Carrenleufu (Green River), and then, returning to the Teca, he followed that stream for some distance, and, by an Indian track, reached the Gennua, the principal tributary of the Senguel. About the middle of its course stands an ancient Indian cemetery, where each grave is marked by a small cairn, two or three feet high. Few bare cliffs are to be found on the Teca and Gennua, but, where the structure of the land is visible, schists and red sandstones appear with a decided dip to the south or south-east. Occasionally, below these strata, primitive rocks—mica and gneiss—may be noticed, and below these again eruptive rocks, probably granite. At the confluence of the Gennua and Senguel the formation changes again to the clays and limestones of the older Patagonian marine formation. An imposing chain of mountains skirts the left bank of the Senguel to a point where the river suddenly changes its direction from SE. to NE., and then divides into several smaller chains, which terminate in a labyrinth of summits looking down on the lake of Colhue. Where the river Chico (?) flows out of the lake Musters, Sr. Ameghino discovered an almost complete skeleton of a huge Dinosaurus, which must have measured about 120 feet long. Sr. Ameghino gives a very detailed account of the geology of the country and the numerous fossils he collected, and his paper is accompanied by sections showing clearly the formations of the country.

## COMMERCIAL GEOGRAPHY.

**A Birmingham Ship Canal.**—The want of better communication between Birmingham and the sea has long been felt, and, some two years ago, four different routes for a ship canal were proposed. Of these, two—the one to the Trent and thus to Hull, and the other to London, following the Thames as far as it is navigable—found few supporters, because they do not pass through any populous centres or manufacturing towns. A canal to Bristol, *viâ* the Worcester and Gloucester Canal and the river Severn, deserves consideration, because of its small initial cost, but, on the other hand, it would not afford direct communication with the great lines of ocean steamers. There remains the fourth route—to Liverpool—which is especially commended by its supporters on the ground that of the sea-borne goods leaving or arriving in the Birmingham district 43 per cent. pass through the port of Liverpool. The canal, as proposed, will pass through Wolverhampton to Stoke-on-Trent, and then, turning to the north-west, through Kidsgrove and Wheelock, will join the Weaver navigation at Winsford. The distance from Birmingham to the junction with the Weaver is 61 miles, from the junction to the mouth of the Weaver at Weston Point 20 miles, and thence to Liverpool 15 miles. The canal is to have a minimum width of 72 feet, and to be capable of accommodating sea-going vessels of 300 tons and barges of 400 tons. The chief engineering difficulty is the change of level. The ground rises from 453 feet above the sea-level on the north-west side of Birmingham to 460 feet at Trentham, and then sinks to only 53 feet at the confluence of the Weaver and Mersey. Boats will be moved from one level to another, not by locks, but by hydraulic lifts, whereby they can ascend or descend at the rate of 20 feet per minute, with very little waste of water. These lifts will consist of caissons in pairs raised by hydraulic rams. There will be a connection between the water in the two rams, so that they will balance one another, and, when the accumulators attached to them make one ram ascend, the other will descend to the same distance. It is said that a pair of caissons installed at Wolverhampton will serve for a difference of level of 60 feet, where eight or ten ordinary locks, entailing a considerable loss of water and time, would be necessary. One tunnel, 300 or 400 yards long, must be made near Trentham. The Weaver locks will hold four vessels of 250 tons each at once, and where this river enters the Mersey there is a depth of never less than 13 feet at low water. The Weaver navigation trustees are said to have offered the use of their waterway at the very favourable rate of 8d. per ton. The promoters of the scheme calculate that they would be able to transport 2 million tons a year, without incurring great expense in barges, by allowing firms and individuals to employ their own boats; and it seems probable that the canal would attract to itself no less amount of traffic, seeing that, in 1885, the traffic over a single canal connected with Birmingham amounted to more than 7 million tons, and that in the same year more than $1\frac{3}{4}$ million tons of goods were brought to, or carried out of, the town by rail. The estimates of the promoters seem moderate, but, of course, there are still many questions left undecided, and the financial difficulties connected with the scheme have not yet been solved.

**Bulgaria.**—The British Vice-Consul at Sofia, Mr. Blech, has sent in a valuable report on the economic and commercial condition of Bulgaria, a summary of which was published in the *Times* of August 26th. The area of Bulgaria, including Eastern Rumelia, or Southern Bulgaria, but excluding the districts ceded to Turkey in 1886, is 38,390 sq. miles, on which dwells a population of 3,154,375 souls, 2,326,224, or about 75 per cent., being Bulgarians, and the remainder

Musulmans (about 20 per cent.), Greeks, Servians, Russians, etc. Of the four States, Bulgaria, Rumania, Servia, and Greece, the first has the largest area and population. In density of population Rumania and Servia come first, with 107 to the square mile, while Greece has only 80. Bulgaria has the smallest public debt, £5,998,553, amounting to only £1, 18s. per head, whereas the next in order, that of Servia, is over £5 per head, and each Greek is burdened with £13, 10s. 7d. of public debt. The Budget of 1890 gives an estimate of £2,901,961, and falls short of the expenditure by £341,766, which will be obtained from arrears of taxes, greater economy in the future, etc. The exports during last year were of the value of £3,223,243, and the imports £2,914,770. There has been a steady increase in both. Great Britain occupies the third place among the customers of Bulgaria, after Turkey and France, taking goods to the value of £503,000. Grain is the principal export, and the imports consist chiefly of cotton and woollen fabrics. With respect to the latter, Great Britain comes second, after Austria-Hungary, with goods to the value of £847,735. Though this sum is larger than the value of the British imports in 1888, it is nearly £30,000 less than that of 1887, while the Austrian imports show an increase of nearly 50 per cent. This is, no doubt, due partly to the completion of the railway system between Vienna and Sofia in 1888, but it must, in Mr. Blech's opinion, be to a large extent attributed to the tariff annexed to the Anglo-Turkish Convention of 1861, which was drawn up when prices were in general much higher than at present, the consequence being that British goods, until the beginning of this year, paid an import duty of 14½ per cent. on their value. On January 1st, however, an agreement was made by which British merchandise was to be subject to a custom duty of 8 per cent. *ad valorem*. Mr. Blech points out that the opening of the Jamboli-Burghas railway will facilitate the introduction of British goods.

The most important towns are Philippopolis, with a population of 33,000 ; Sofia with 30,000 ; Rustchuk, Varna, Shumla, and Slivno, with 20,000 to 30,000 each. On September 5th the *Times*, quoting from the same report, stated that the Musulmans are leaving the country in large numbers, as many as 600,000 having emigrated since 1876. One result of this movement is a loss of some £500,000 to the exchequer, for a large area of ground is left uncultivated. Again, the Christians resort to the usurers to borrow money wherewith to buy the land of the emigrants, and hence money-difficulties arise which often end in the ruin of the purchasers. No definite cause can be assigned for the dissatisfaction prevailing among the Mohammedan population, but, having once been the dominant race, they no doubt feel the alteration in their position, and their religious feelings may be wounded by the proximity of their Christian neighbours' pigstyes. The Government has done all in its power to render them contented, but has failed.

Mr. Blech gives an interesting account of the communistic associations known as *Zadrugas*. A number of families agree to work a farm together, and put their money into a common stock. A *Domakin*, or manager, is chosen, who allots the work to the different members of the community, keeps the accounts, buys seed, and sells the produce, etc., and the *Domakinia*, usually the wife of the *Domakin*, superintends the work of the women. Any member may withdraw from the association, receiving his share of the property, but sons cannot claim their share during their father's lifetime. There are also special regulations with regard to the dowries of daughters, widows' portions, etc. Similar to these are the co-operative gardening societies, each consisting of 40 to 60 men, who often leave home in the early spring and repair to distant towns—as far even as Brussels and St. Petersburg, —where they rent a piece of ground and grow vegetables, and at the end of the season return home and divide the profits. One such association reaped a golden

harvest at Metz during the Franco-German war when prices were exorbitantly high.

**The Trade of Burma.**—The returns for the year ending March 31st are of a most satisfactory character. The value of the trade was by far the highest on record, the imports being worth about £161,500 more than in the previous year, and the exports £1,318,000 more. During the two years before the war the average value of the imports was £2,578,000 ; during the two transition years, £2,447,000 ; and for the last three years, £3,699,000. The exports during the same periods were £4,077,000, £4,592,000, and £4,702,000 respectively. The trade with Great Britain during the past year was of the value of £4,078,600. The chief imports were cotton goods, oils, provisions, ships and parts of ships ; and the exports were rice, raw cotton, and teak. The increase in the import trade was mainly due to large supplies of kerosene brought from the United States, but in almost every article trade is steadily advancing.

**Trade on the Great Lakes of America.**—It is astonishing how large an amount of traffic is carried on by these waterways. During the 234 days the Detroit river was open to navigation last year the quantity of goods which passed along it was 10,000,000 tons more than the entries and clearances of all the seaports of the United States, and three million tons more than the combined foreign and coasting trade of the ports of London and Liverpool. This does not include the traffic between the lakes Superior and Michigan, or between Erie and Ontario, or the local traffic on these lakes. Nearly three times as many boats pass through the Sault Ste. Marie as through the Suez Canal, and it must be remembered that the latter is open to navigation all the year round. The tonnage in 1889 was 7,221,935 as against 6,783,189 for the Suez Canal. The figures relating to shipbuilding are equally surprising. In 1889 the tonnage of vessels constructed on the lakes was nearly exactly the same as of the vessels launched in all the dockyards on the coasts of the Atlantic, Pacific, and Gulf of Mexico. Of the whole steam tonnage of the United States about one-third is on the lakes. There were in the same year 21 sailing vessels of between 1000 and 2500 tons each, and 156 between 500 and 1000 tons. The growth of shipbuilding has been very marked within the last few years.

## MISCELLANEOUS.

The British Vice-Consul at Caldera encloses in his last report a statement made by an English engineer respecting a survey for a **Railway across the Andes** from Tinnogasta in the Argentine Republic to Puquios in Chili. It would cross the main range by the pass of San Francisco, 16,000 feet above the sea-level. The length of the line would be 270 miles. The route presents no great difficulties to the engineer.

It is notified in the *London Gazette*, November 4th, 1890, that the dominions of the Sultan of **Zanzibar** are placed under the protection of Her Britannic Majesty. The territory concerned is that defined in the Notes of Count Hatzfeldt, 29th October 1886, and of the Earl of Iddesleigh, November 1st of the same year, as belonging to the Sultan, with the exception of the territory lying to the south of the river Umba, of the island of Mafia, and of the districts of Barava, Merka, Mukdisho, and Warsheikh.

In accordance with the Agreement between Great Britain and France, August 10th, 1889, commissioners have been appointed for the **Delimitation of the Frontiers of the Gambia and Sierra Leone.** Major Peacocke, R.E., C.M.G., will act as

British Commissioner for the Sierra Leone portion of the work, and Captain Kenney for the Gambia. They will confine themselves to the task for which they have been appointed, and will not deal with matters concerning the encouragement of trade, etc.

News has been received through a telegram from **Mr Joseph Thomson**, dated August 6th. He left England some months ago, accompanied by a son of Colonel Grant, to accomplish a mission on behalf of the British South Africa Company. While on the British side of the Ruo river he was ordered to stop by some Portuguese troops, who, on his refusal, fired at his party, fortunately without effect. Both travellers were in excellent health, and expected to reach Msiri's kingdom, by way of the Loangwa river and the Barotsé country, in about six weeks.

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## NEW BOOKS.

*Homes of Family Names in Great Britain.* By Henry Brougham Guppy, M.B. London: Harrison and Sons, 1890. Pp. lxv + 601. *Price* 10*s.* 6*d.*

Had Mr. Guppy confined his researches to England alone, the result of his labours would have been more satisfactory. The part relating to Scotland is far from complete, and there are several serious omissions in that portion of the work. The author is quite aware of this fault, and explains how it came about, yet reference to *Slater's Directory* would, we imagine, have done very much to supply what is wanting. However, it is but fair to Mr. Guppy to add that the absence of a large yeoman class in Scotland, the breaking up of many great estates, and the transfer of extensive tracts of land from the possession of a large number of the ancient families into that of strangers and aliens have resulted in a fluctuation in the resident population that tells much against the complete success of an inquiry such as that now under review.

That portion of the work dealing with England is thoroughly well done, and, if the method adopted for the collection of facts has been somewhat rough and ready, it has certainly worked well in the hands of Mr. Guppy, whose aptitude in marshalling facts, and facility in drawing sound conclusions, are well illustrated. The study of the distribution of family names is not only of considerable interest, but of great importance in the consideration of ethnological questions, and any one who is inclined to pursue a course of investigations in this direction will, in so far as England is concerned, find this a safe and most valuable guide, whilst its utility as a work of reference cannot be questioned.

We are glad to observe that the author half promises another volume upon the same subject, and we sincerely hope that he may receive the help and encouragement necessary to the realisation of his wishes. In the supplementary volume we would suggest the desirability of considerable attention being given to the migration of names.

The volume is well printed and handsomely bound; it has a small but clear map of England, and a full index.

*Reisen und geologische Untersuchungen in Bulgarien.* Von Franz Toula, o. ö. Professor an der k. k. technischen Hochschule in Wien. Mit einer geologischen Karte, vier geologischen Profilen, sieben Vollbildern, und zwei Abbildungen im Texte. Wien, 1890. Commissionsverlag von Ed. Hölzel. Pp. 144.

This little book is the written enlargement of a lecture delivered on 19th March

1890 before the Society for the Diffusion of a Knowledge of Natural Science in Vienna. It consists of three separate parts, as we learn by turning over the pages, for there is unfortunately neither table of contents nor index. In the first division the author tells us about his journeys through and over the Balkans, extending over a period of thirteen years, from 1875 to 1888. Usually, when his summer holidays came, Herr Toula hastened away to the Balkans to prosecute his favourite study, the geology of the eastern half of the peninsula. The most interesting passages are perhaps those in which the curious little town of Tirnova is described; the description is helped out by four engravings from photographs of the place. The second portion of the book includes the *pièce de resistance*, a general geological sketch of Bulgaria and Eastern Rumelia, and is very useful as a summary of geological knowledge respecting a part of old Europe that gets scant attention from students. And the value of this sketch is enhanced by the descriptive catalogue of works dealing with the geology of Bulgaria and the adjoining regions, which constitutes the concluding portion of the book. The geological map that accompanies it claims to embody not only the results of previous workers, but those yielded by the latest investigations of the author himself and of other contemporary students.

*Greek Pictures, Drawn with Pen and Pencil.* By J. P. Mahaffy, M.A., D.D., Fellow of Trinity College, Dublin, Author of *Social Life in Greece; Greek Life and Thought; Rambles and Studies in Greece.* London: The Religious Tract Society, 1890. Pp. 223. *Price* 8*s.*

One of the well-known "Pen and Pencil" series. The publishers could scarcely have intrusted the task of illustrating Greek life, ancient and modern, to a more competent hand than Professor Mahaffy's. He has steered an excellent middle course between the Scylla of classical erudition and the Charybdis of dry topographical detail. There is a great wealth of detail in the pages, but it is so skilfully woven into the narrative that, instead of making it heavy, it lightens by embroidering it with the warm pattern of living interest. There is a profusion of illustrations, some of them beautifully soft and effective. But are not some amongst them idealised, or rather imaginative, sketches? Such have no warrantable place in a book of this class. Presumably, the *islands* of Greece are to have a separate volume; why else have they been omitted from the present book? They are, some of them, very Greece of very Greece. The book can be warmly recommended as a desirable prize for a youth or girl who takes an interest in the cradle of European civilisation. There is a fairly adequate index.

*Éthiopie Méridionale: Journal de mon Voyage aux Pays Amhara, Oromo et Sidama, Septembre* 1885 *à Novembre* 1888. Par Jules Borelli. Paris: Librairies-Imprimeries Réunies, 1890. Pp. 520.

M. Borelli's explorations in the countries to the south of Abyssinia have repeatedly been referred to in our pages. His name is more especially associated with the much-vexed question of the course of the river Omo, in regard to which his journeys contributed important *data*. The present volume is simply a transcript from his diaries, the appendices summarising very briefly the scientific results he was able to achieve. It is published in the usual sumptuous style with which readers of French works of travel are familiar, and compares favourably in this respect with others of its class. The numerous illustrations are in themselves of value—comprising one of the best series we have seen of characteristic native heads—and the maps are all good.

English readers will, however, take exception to the trivialities inseparable from this style of book-making. In some respects a traveller's diaries—especially when they are written so well as are those of M. Borrelli—give the reader a very realistic idea of the countries described; but, with the wealth of the material at the author's command, it is to be regretted he did not attempt a more ambitious and satisfactory manner of treatment. Many of his entries are simply rough notes, no attempt having been made to expand them into readable sentences, and the trifling details of camp-life are referred to with wearisome repetition. But, judged by its own standard, we have read no more interesting volume, whilst the illustrations leave nothing to be desired. M. Borelli is an accomplished and careful observer, and is to be congratulated on the results of his recent journey.

*An Account of the Manners and Customs of the Modern Egyptians. Written in Egypt during the Years* 1833-1835. By EDWARD WILLIAM LANE. With a Biographical Notice of the Author. Pp. xxiv + 552. Ward, Lock, and Co., London, New York, and Melbourne, 1890. *Price* 2*s.*

This work has long been noted as the most complete account published of the domestic life, religious ceremonies, and articles of faith of the Egyptians, and, though the epithet "modern" is now somewhat out of date, much that is revealed in this book is equally true at the present day. Many readers, however, will value it as a record of Egyptian manners before they had to any great extent been modified by foreign influence. It is well known that Mr. Lane, by adopting the native dress and manner of life, gained opportunities of investigating more thoroughly than any other writer the private life of the people. He was received among them almost as one of themselves; and he often relieves the unavoidable monotony, and enhances the vividness of, his descriptions, by some incident relating to an individual whose intimacy he enjoyed. Everything finds a place in this account, from laws, literature, and science down to the simplest actions and most ordinary household utensils. The present edition is reprinted from the third, published in 1842 by Charles Knight, which has never been surpassed. It forms one of the volumes of the "Minerva Library of Famous Books," and is neatly bound and got up in the style common to the whole series. The numerous illustrations are not, of course, in a book at such a price, of a very high class—they are probably printed from the worn plates of the earlier edition—but they are clear, being in some cases mere outlines, and never deeply shaded, and therefore assist the reader to acquire an accurate idea of the object represented. A copious index adds greatly to its utility as a book of reference.

*Barth's Travels in Northern and Central Africa.* "The Minerva Library of Famous Books." Illustrated. London: Ward, Lock, and Co., 1890. Pp. 606. *Price* 2*s.*

Dr. Barth's reputation as a geographer and traveller is too well known to need any special reference here. It will be remembered that in 1849 he joined Richardson's famous overland expedition from Tripoli across the Sahara Desert to the Súdan, and that between 1850 and 1855 he explored some entirely new country, during which he twice crossed the Desert and discovered the Benué River. He explored Kanem and the country to the south of Lake Tsad, and reached Timbuktu. To his painstaking researches, and especially to his five handsome volumes published in 1857, geographers are largely indebted for their knowledge of the Súdan. The present reprint covers only the first half of Dr. Barth's monumental work; and, published in this compact and inexpensive form, will be welcome to many readers who may not be discouraged by the 600 closely-printed pages. Some

of the original engravings and lithographic plates have been reproduced ; but the rough type-map is of no use as a guide to the text. The index is far too small, filling only two pages, and not sufficient care has been given to the revision of the place-names.

*The Lord's Prayer in the Languages of Africa, and the Districts where Spoken.* With Map. London : Gilbert and Rivington, 1890. Pp. 23. *Price* 1*s.*

The Lord's Prayer done into close upon fifty languages of Africa will perhaps prove of some use—but very little, we fear—to philological students. Those specially interested in the Dark Continent may like to possess the little book as a curiosity.

*Perim as it is: Historical Sketch of the Coaling Station at Perim Island.* By Hinton Spalding, F.R.G.S. Liverpool : Turner and Dunnett.

The Island of Perim, which lies in the Red Sea at the narrowest part of the Straits of Bab-el-Mandeb, has been held by Great Britain since 1855. It possesses a natural harbour 1½ miles in length by about the same in breadth, with an entrance 860 yards wide. In 1883 the Perim Coal Company established a coal depôt on the island, which is now largely used by the many steamers passing up and down the Red Sea. The facilities for coaling seem to be superior to those offered by the neighbouring port of Aden, and the enterprising promoters of the Perim Coal Company have reason to be satisfied with the success of their undertaking.

*The Navigation of the Caribbean Sea and Gulf of Mexico.* Vol. II. Second Edition. *The Coast of the Mainland from the Rio Grande del Norte, Mexico, to Cape Orange, Brazil, with the adjacent Islands, Cays, and Banks.* Revised by R. C. Ray, U.S.N. Washington Government Printing Office, 1890. Pp. x and 410.

This is another of the excellent Sailing Directions issued by the United States Hydrographic Office, and is full of information regarding a most interesting region. It will prove of great utility not only to those for whose use it is more immediately intended, but to the scientific geographer generally. An admirable feature is the chapter on hurricanes, winds, and currents, which is illustrated by several diagrams and sketch maps.

*From Peru to the Plate, Overland (with Sketch-Map).* By Patrick F. Evans. London : Bates, Hendy, and Co., 1889. Pp. 124. *Price* 2*s.* 6*d.*

Although the journey here described, passing through South-western Bolivia into the Argentine territory, offers no serious difficulties to a traveller in robust health, accustomed to rough it, and acquainted with Spanish, it is sufficiently beyond the ordinary beaten tracks to afford abundant incident and adventure ; and the writer, evidently a man of resource and of a humorous and genial nature, has understood well how to turn these to the best advantage at the time, and to record them afterwards. The journey was undertaken some eight or nine years ago ; but the countries traversed do not change rapidly, though the difficulties of travelling in Peru during the war with Chile were enhanced for Englishmen by their supposed sympathies with the latter power, while in Bolivia British interests seem, according to the writer, still to be hampered by a quarrel dating from Palmerstonian times. The hospitality and kindness of individuals, however, especially in critical times of illness and anxiety, and the readiness of resource of

the writer and his companion, smoothed the path greatly. Although few halts were made, except from necessity, the reader obtains a clear idea of the nature of the country traversed; and the characters of the different classes of people encountered—Indians, *arrieros*, soldiers, and the rest—are very graphically touched. The details, too, of the necessary requisites to be provided for such a journey are useful. Perhaps the most interesting part of the journey, geographically, is the visit to Lake Titicaca, though the description is short, and the visit hurried and incomplete. The level of the great lake is said to have fallen 48 feet within seven years, and certainly the railway which was laid down along its shores is now several miles away. The fact is, that distinct beaches are found 70 and 100 feet above the present level; and Dr. Hettner, who examined the locality two or three years ago, found sedimentary deposits at a height of 650 feet. But he considers that between the period of the 70-feet beach (which he ascribes to the glacial period) and that of these deposits there has been more than one fluctuation of level, and that the lake was at one time lower than it is at present.

*The Red Mountain of Alaska.* By Willis Boyd Allen. London: S. W. Partridge and Co., n.d. Pp. 320. *Price* 2*s.* 6*d.*

Under the guise of a tale of travel and adventure, Mr. Allen has succeeded in conveying a good deal of information about the physical features, climate, fauna, flora, and minerals of Alaska, as well as about the manners, customs, and disposition of the native clans, whom, we suspect, he is inclined to look upon as the posterity of the so-called lost tribes of Israel. The tale is thoroughly healthy in tone, abounds in adventure, and contains much of interest and importance concerning a little-known part of the world. Towards the end of the volume there is some padding which, being good of its kind, need not be seriously objected to. The book is well printed and tastefully bound, while the illustrations are generally spirited, and all executed with great delicacy. Some of the pictures represent views of Alaskan scenery, utensils and ornaments of the Indians, etc., as well as incidents in the tale itself. Mr. Allen's work ought to prove a most welcome present to boys, and those of maturer age might do worse than spend some idle hours in its perusal. It is but fair to add that the author has evidently made himself acquainted with all the best and latest scientific literature regarding the region of which he writes.

*On the Structure and Distribution of Coral Reefs; also, Geological Observations on the Volcanic Islands and parts of South America visited during the Voyage of H.M.S. "Beagle."* By Charles Darwin. With Maps, Plates, and Numerous Illustrations. And a Critical Introduction to each Work by Professor John Judd, F.R.S. "The Minerva Library of Famous Books." London, New York, and Melbourne: Ward, Lock, and Co., 1890. Pp. xx and 549. *Price* 2*s.*

No one, taking the slightest interest in bibliography, can have failed to notice the large and increasing number of reprints and new editions of many old books of interest and value which have lately issued from the press, but among them all we know of none—of any scientific interest at least—that ought to meet with a wider or warmer welcome than the present volume. And this for several reasons. First, the war which, for the last few years, has raged around the question of the origin and structure of coral reefs, has caused the Darwinian theory of their construction to be looked into afresh, with more minute care than had formerly been the case; and, so scarce had the original edition become, that many found it difficult or impossible to obtain access to, or become possessed of, the work. Secondly, new stores of

knowledge have been acquired since the author made his studies on volcanoes, and it is well to have the opinions of so careful an observer and keen a reasoner as Darwin, and the results of his labours, in so convenient a form. And, thirdly, it is amazing how so much matter, taking it on no higher ground, has been supplied for the modest sum of a couple of shillings. The publishers thus give evidence of their enterprise, and their efforts to bring the best of knowledge within the reach of all deserve our good wishes for the success of their valuable series. The editor, also, must be congratulated on having secured, in this case, the services of so competent an authority as Professor Judd in preparing the various introductions, which, in the main, are models of what such articles ought to be. Mr. Judd is, however, a hero-worshipper, and any doctrine or theory connected with the names of Lyell or Darwin is apt, in his view, to be well-nigh too sacred for question; and so, when he comes to treat of Murray's theory of coral reefs, although he confesses the great importance of Geikie's adherence thereto, he turns aside from the subject, declaring that the supporters of the later theory are mostly zoologists, and not geologists. This, it appears to us, is hardly just; but otherwise we can find no fault either with his matter or the manner in which it is set forth.

The volume is well printed, and has a copious index, besides a large and well-chosen set of maps and diagrams, and numerous illustrations. Some of the latter are not very distinct, but, taking everything into account, the whole production is, indeed, marvellous for the price, and, good as all the former volumes of the series have been, none of them approach in excellence this, the latest, addition to the "Minerva Library." It may be added that the volume can also be had in a superior binding at the price of five shillings.

*Journal of Researches into the Natural History and Geology of the Countries visited during the Voyage of H.M.S. "Beagle" round the World, under the command of Captain Fitzroy, R.N.* By CHARLES DARWIN, M.A., F.R.S. London: T. Nelson and Sons, 1890. Pp. 615.

It is now unnecessary to attempt any criticism of Darwin's well-known *Journal*. Its place, which has long ago been fixed in scientific literature, is likely long to be retained. Not that we can at the present day accept as absolutely authoritative the whole contents of the volume,—the author was not infallible, and knowledge has advanced since the year 1831, when the *Beagle* sailed away upon that voyage which Darwin has made so memorable. In this new edition the *Journal* is presented in its original dress, no attempt, beyond a short prefatory note, having been made to alter it or "bring it down to date." In following this course it appears to us that the publishers have done wisely. What we look for and expect is not so much the results of the labours of later inquirers—following along Darwin's lines, and achieved since the publication of the first edition of this work—as what the author himself saw, and what he deduced from his observations. The edition now brought out by the Messrs. Nelson is a good one. The illustrations are numerous and fairly well executed, and the index ample; but we miss a good track chart. The addition of such a chart would have been an immense improvement. The note on p. 604 ought to have been moved to the foot of p. 123, as it is practically useless in its present position.

*The Colonist's Medical Handbook, with Directions for Treatment of Fractures, Dislocations, and the principal Medical and Surgical Diseases.* By E. A. BARTON, M.R.C.S., L.R.C.P. London: Cassell and Co., 1890. *Price* 2*s.* 6*d.*

This handbook is intended for the use of colonists and others who are out of reach of medical assistance. It is clearly written and in such simple language that the

non-professional reader should have no difficulty in understanding it. Only three drugs are mentioned, Opium, Quinine, and Epsom Salts, and the rules for their administration are distinctly laid down. "The appliances in use for the treatment of emergencies," as the author says, "are only those likely to be found in any squatter's hut." We cordially recommend this book not only to the notice of travellers and others, who may be out of reach of medical assistance, but to all who take an interest in ambulance work.

"*Bennachie.*" By A. Inkson M'Connochie. Aberdeen: D. Wyllie & Son. *Price* 1*s.*

*Bennachie* treats of the history, legends, poetry, geology, and botany of the hill, and is also a road-guide, providing a clearly-drawn map to assist the tourist. This map appears as the work of the author, but, while in the text the year 1411 is given as the date of the battle of Harlaw, the map, following Black's and others, gives it as 1414. The book is not the work of a novice, and must be judged accordingly. How much more valuable would it have been if a bird's-eye view of the fortifications, drawn by so competent a map-maker, had taken the place of the sketch-book illustration of part of them. Why are small circular enclosures of loose stones "Roman" camps? And why is the interlaced ornamentation of the Maiden Stone to be accounted for by the use of wicker-work in "Britain"? Is the interlaced ornamentation found in Pompeii to be accounted for in the same way? The statement that doubtless the whole mountain got its name as signifying the "Hill of the Pap"—Gaelic, *cioch*; gen. *ciche*: *Bein na ciche*—is too strong. Are the terminals *che* always sounded in Gaelic? See Mr. M'Connochie's own illustrations of the use of the same word in the vicinity. There is no such god as "Chie"! There is a Hea, Hu, a legendary progenitor of the Welsh among others. *Bein Mac Hea*, the "Hill of the Sons of Hea," seems, from a philological point of view, the most probable. The book is quite worth its cost to any visitor of the hill.

*London Pictures, drawn with Pen and Pencil.* By the Rev. Richard Lovett, M.A. With One Hundred and Thirty Illustrations. London: The Religious Tract Society, 1890. Pp. 224. *Price* 8*s.*

When it is said that both in illustrations and literary matter this volume maintains the excellent standard of former issues of the series, no higher praise need be given. It is true that among the numerous pictures some are very old friends indeed, and a few appear to have been added purely as padding—a street lamp in a snowstorm, for instance, not being a sight characteristic of London more than of any other city which winter visits; but almost all are so good, and so admirably produced, that they ought to be welcome. Mr. Lovett has contributed the letter-press to more than one volume of the series, and it need only be said that here, as in former cases, he shows remarkable tact in picking out the various characteristic scenes, buildings, localities, and incidents particularly deserving of notice, and describes them shortly, pithily, and in well selected order. As is proper in a volume of this kind, statistics are seldom referred to, but, when used, they are of the right kind, and calculated to impress upon the mind of the reader the matter they illustrate. Altogether, this is a good popular account of London.

*Illustrated Guide to the Rhine and the Rhineland.* London: Ward, Lock, and Co. Pp. 208. Maps and Illustrations. *Price* 1*s.*

This small guide to the Rhine is a well-printed volume, but, in its manner of

treatment, does not differ materially from others of its class. It should serve the purpose for which it is intended, and, though not written in an attractive style, deals with most of the points upon which a tourist requires information.

*Handbook of the Health Resorts of Switzerland.* By N. Loetscher, M.D. Fourth Edition. Zürich : J. A. Preuss, 1890.

This guidebook gives a description of all the spas and health and summer resorts of Switzerland, climatic and hygienic conditions, dietetic and medicinal modes of treatment, etc. The unprofessional reader will find clearly set forth the natural characteristics and medicinal value of the numerous health resorts. The health stations are all given categorically, together with the diseases for which they are beneficial. It gives a list of hotels and pensions, with the cost of living and other information, arranged as in Baedeker. It is embellished with about 200 illustrations, panoramas, aad special maps of Switzerland. It is well printed and strongly bound, and forms one of the most complete handbooks that has been published of late years.

*A Holiday Tour in Austria.* By Rev. H. Pelham Stokes, M.A., F.R.G.S. London : Digby and Long, 1890. Pp. 43. *Price* 1*s.*

This little book owes its existence to the author's hope that its perusal may induce many who are now unacquainted with Austria to visit it. That hope is not likely to be realised, for not only is the writer's style bald and uninteresting, but the information supplied is scrappy, incomplete, and, except in so far as it relates to the hotels, useless to all but the merest tiro in travel. The whole volume may easily be read in fifteen minutes, so large is the print, so numerous are the blank spaces, and so considerable is the space taken up by ornamental headings and tail-pieces. The publishers, however, have done their part of the work well.

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## ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

### REPORT OF COUNCIL.

#### Sixth Session, 1889-90.

The Council have the honour to submit the following Annual Report :—

During the past Session the Society entered into possession of its new premises in the National Portrait Gallery, Edinburgh, which were formally opened by Mr. H. M. Stanley on 10th June 1890.

The Society, at a General Meeting on 23d January 1890, formally adopted the Resolution of the Council instituting an Entrance-Fee of one guinea on and after the commencement of Session 1890-91.

The public interest aroused by Mr. Stanley's visit to Scotland, during which he delivered addresses before the Society in Edinburgh, Glasgow, Dundee, and Aberdeen, led to a very material increase in the Society's membership.

The first Gold Medal awarded by the Society was conferred upon Mr. H. M. Stanley in person, on the occasion of the Society's meeting at Edinburgh, on 10th June 1890, the Marquis of Lorne in the chair.

### Membership.

The following is a Statement of the Membership of the Society, as at 31st October 1890 :—

| District. | Membership. |
|---|---|
| Edinburgh, | 897 |
| Glasgow, | 354 |
| Dundee, | 100 |
| Aberdeen, | 76 |
| England, Ireland, British Colonies, and Foreign Countries, | 147 |
| | 1574 |

*Of the above,* 139 *are Life-Members.*

The following shows the increase in the Society's Membership during the Session, and the losses by deaths and resignations :—

| | | |
|---|---|---|
| Membership at 31st October 1889, | | 1160 |
| Members elected during Session 1889-90, | | 517 |
| | | 1677 |
| Deduct Deaths, | 28 | |
| „ Resignations, | 75 | |
| | — | 103 |
| Net Membership, 31st October 1890, | | 1574 |

The net increase of Membership during the Session was therefore 414.

Compared with the results of the previous Session : the Edinburgh Membership was increased by 251, the Glasgow Membership by 115, the Dundee Membership by 17, the Aberdeen Membership by 22, the foreign Membership by 9, and the number of Members who have compounded for Life, in a single payment of Ten Guineas, by 14.

Monsieur Elisée Reclus and Major J. W. Powell were, on 25th November 1889, elected Honorary Members of the Society. There are, moreover, 46 Honorary Corresponding Members.

The Council is indebted to the Conveners, Honorary Secretaries, Treasurers and members of the Local Committees in Glasgow, Dundee, and Aberdeen, for the services they have rendered in promoting the interests of the Society's Branches.

### Diplomas of Fellowship.

Honorary Diplomas of Fellowship, in recognition of services rendered to the Society, or to geographical science, were awarded by the Council to the following : E. G. Ravenstein, Esq. ; Henry O'Neill, Esq.; Colonel Sir Henry Yule ; General Greely ; Captain Nelson ; Lieutenant Stairs ; Dr. Thomas Parke ; A. J. M. Jephson, Esq. ; William Bonny, Esq. ; Sir William Mackinnon, Bart. ; and Sir William Macgregor.

Diplomas of Fellowship were granted by the Council to the following Ordinary Members of the Society, on their application :—W. Walsh Pearson, Esq. ; the Rev. John Inglis, D.D. ; Professor Hrolf C. V. Stevens ; Alexander M. Faichney, Esq. ; Kenneth Cochrane, Esq. ; Richard Malcolm, Esq. ; J. Batalha-Reis, Esq. ; Robert Young, Esq. ; Robert P. Gilbertson, Esq. ; Dr. William Greenlees ; and the Rev. C. C. Mackenzie.

### Finance.

The Council submits the following Financial Statement :—

# ABSTRACT OF THE ACCOUNTS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

*From 31st October 1889 to 31st October 1890.*

| | | | |
|---|---|---|---|
| **FUNDS AT THE CLOSE OF LAST ACCOUNT :—** | | | |
| £1000 Glasgow and South-Western Railway 4 per cent. Funded Debt, cost, 29th May 1885, | | £1102 19 | 9 |
| Cash in Bank of Scotland, Edinburgh— | | | |
| On Deposit Receipt, dated 15th August 1889, | £100 0 0 | | |
| ,, Account Current, | 149 17 10 | | |
| | £249 17 10 | | |
| *Deduct :* Due to the Honorary Treasurer, | £9 14 4 | | |
| *Less :* Due by the Secretary, | 1 6 11 | | |
| | 8 7 5 | 241 10 | 5 |
| | | £1344 10 | 2 |
| **ORDINARY SUBSCRIPTIONS :—** | | | |
| 24 Life Members, at £10, 10s., | £252 0 0 | | |
| 2 Annual Subscriptions of £1, 1s. for year 1886-87, | 2 2 0 | | |
| 13 Do. do., 1887-88, | 13 13 0 | | |
| 79 Do. do., 1888-89, | 82 19 0 | | |
| 1336 Do. do., 1889-90, | 1402 16 0 | | |
| 10 Do. do., 1890-91, | 10 10 0 | | |
| 1 Do. do., 1891-92, | 1 1 0 | | |
| | £1765 1 0 | | |
| FEES received for Society's Diploma, | 13 13 0 | | |
| SUMS received under the Society's Scheme for the encouragement of Geographical Education, | 0 14 6 | | |
| SPECIAL SUBSCRIPTIONS towards Expenses of Removal to New Premises, | 257 4 0 | | |
| PROCEEDS OF LECTURES in Edinburgh, Dundee, Aberdeen, and Glasgow, | 463 18 11 | | |
| PROCEEDS OF MAGAZINES sold, | 49 17 3 | | |
| DIVIDENDS and Bank Interest, | 45 19 6 | | |
| RECEIPTS from Loan of Maps, | 1 1 0 | | |
| | 2597 9 | 2 | |
| | £3941 19 | 4 | |

| | | | |
|---|---|---|---|
| MAGAZINES, Printing Paper, Lithographing, etc., from Nos. 8 to 12 of Vol. V., and Nos. 1 to 7 of Vol. VI., all inclusive, and for Postage, | £686 16 | 2 | |
| *Less :* Received during the year for Advertising, | 60 0 | 0 | |
| | £626 16 | 2 | |
| GENERAL PRINTING, | 32 15 | 8 | |
| BOOKS and other Furnishings for Library, | 42 1 | 4 | |
| RENTS OF HALLS, and other expenses of Lectures, including Honorarium to H. M. Stanley, and consequent extra outlays, | 664 12 | 10 | |
| RENT OF COUNCIL ROOM, Taxes and Gas, Repairs, Insurance, etc., | 78 17 | 4 | |
| SALARIES :— | | | |
| To *Secretary*, year to 10th October 1890, | £250 0 0 | | |
| ,, *Clerks*, ,, ,, | 64 7 6 | | |
| | 314 7 | 6 | |
| EXPENSES connected with the Society's Education Scheme, | 5 15 | 6 | |
| MISCELLANEOUS, including Stationery, Wages to Officer, Porter, Messenger, General Expenses, Advertising, Cleaning, Bank Charges, Postages, and Office Furniture, £138, 10s. 10d., less for Fittings sold, £7, 5s. 1d., | 131 5 | 9 | |
| EXPENSES of Removal to New Premises in National Portrait Gallery, | 187 7 | 10 | |
| | £2083 19 | 11 | |
| **FUNDS AT CLOSE OF THIS ACCOUNT :** | | | |
| £1000 Glasgow and South-Western Railway 4 per cent. Funded Debt, cost, 29th May 1885, | £1102 19 | 9 | |
| Cash in Bank of Scotland : | | | |
| On Deposit Receipt, dated 15th August 1889, £100 0 0 | | | |
| On Account Current, at Glasgow, £345, 18s, 11d, and at Edinburgh, £297, 14s. 4d., 643 13 3 | | | |
| £743 13 3 | | | |
| *Add*— | | | |
| *Due* by the Hon. Treasurer, £2 6 0 | | | |
| ,, by the Secretary, 9 0 5 | | | |
| 11 6 5 | | | |
| | 754 19 | 8 | |
| | 1857 19 | 5 | |
| | £3941 19 | 4 | |

*Edinburgh, 15th November* 1890.—I have examined the Accounts of the Royal Scottish Geographical Society for the year ending 31st October 1890, of which the above is an Abstract, and compared them with the Vouchers and Instructions thereof, and find the same correct and sufficiently vouched.

JAS. M. MACANDREW, C.A.

# ABSTRACT OF THE ACCOUNTS OF THE

## From the Commencement 1884

| | Year ending 31st October. | | | | | | Total. |
|---|---|---|---|---|---|---|---|
| | 1885 | 1886 | 1887 | 1888 | 1889 | 1890 | |
| Subscriptions towards Preliminary Expenses,[1] | £ s. d. 547 11 0 | £ s. d. 5 19 0 | £ s. d. .. | £ s. d. .. | £ s. d. .. | £ s. d. .. | £ s. d. 553 10 0 |
| Ordinary Subscriptions, viz.: Life Members, | 682 10 0 | 81 18 0 | 160 13 0 | 219 9 0 | 114 9 0 | 252 0 0 | 1510 19 0 |
| Annual Subscriptions, | 898 16 0 | 1011 3 0 | 981 15 0 | 1067 17 0 | 999 12 0 | 1513 1 0 | 6472 4 0 |
| Proceeds of Lectures, | 32 14 11 | 70 10 9 | 42 1 0 | 23 1 0 | 40 1 0 | 463 18 11 | 672 7 7 |
| Received for Advertising, etc., in Magazine, | 70 0 0 | .. | 94 8 0 | 60 0 0 | 60 0 0 | 60 0 0 | 344 8 0 |
| Dividends, Bank Interest, etc., | 17 9 11 | 37 19 0 | 40 2 8 | 41 17 7 | 44 4 7 | 45 19 6 | 227 13 |
| Proceeds of Magazines sold, | .. | 70 7 8 | 17 19 2 | 81 9 7 | 45 14 11 | 49 17 3 | 265 8 7 |
| Subscription, etc., towards encouragement of Geographical Education, | .. | 23 13 0 | 5 15 0 | 6 0 0 | 7 8 6 | 0 14 6 | 43 11 0 |
| Special Subscription towards Nyassa Meeting, | .. | .. | 5 14 9 | .. | .. | .. | 5 14 9 |
| Fees for Society's Diploma received, | .. | .. | .. | 26 5 0 | 12 12 0 | 13 13 0 | 52 10 0 |
| Special Subscription towards Rankin Exploration Fund, | .. | .. | .. | 21 3 0 | 2 0 0 | .. | 23 3 0 |
| Grant received from Surplus Funds of Edinburgh Exhibition of 1886, | .. | .. | .. | .. | 95 15 1 | .. | 95 15 1 |
| Special Subscription towards Removal Expenses, | .. | .. | .. | .. | .. | 257 4 0 | 257 4 0 |
| Receipts from loan of Maps, | .. | .. | .. | .. | .. | 1 1 0 | 1 1 0 |
| | 2249 1 10 | 1301 10 5 | 1348 8 7 | 1547 2 2 | 1421 17 1 | 2657 9 2 | 10,525 9 3 |

£10,525 9 3

# ROYAL SCOTTISH GEOGRAPHICAL SOCIETY.

## TO 31ST OCTOBER 1890.

| | Year ending 31st October. | | | | | | TOTAL. |
|---|---|---|---|---|---|---|---|
| | 1885 | 1886 | 1887 | 1888 | 1889 | 1890 | |
| Preliminary Outlay, Printing, etc., | £ s. d. 387 19 2 | £ s. d. .. | £ s. d. .. | £ s. d. .. | £ s. d. .. | £ s. d. .. | £ s. d. 387 19 2 |
| Furniture and fitting Council Room, etc., | 293 6 6 | .. | .. | .. | .. | .. | 293 6 6 |
| Magazine, Printing, etc., | 333 15 11 | 543 8 9 | 560 0 5 | 670 13 11 | 601 14 6 | 686 16 2 | 3396 9 8 |
| Books for Library, | 27 18 2 | 29 13 6 | 29 16 2 | 27 16 4 | 13 1 0 | 42 1 4 | 170 6 6 |
| Rent of Hall, etc., for Lectures, | 13 18 6 | 105 7 7 | 120 2 1 | 104 15 3½ | 162 1 10 | 664 12 10 | 1170 18 1½ |
| Special Donations, | 25 0 0 | .. | .. | .. | .. | .. | 25 0 0 |
| Expenses of Loan Exhibition of Maps at Aberdeen, | 14 5 1 | .. | .. | .. | .. | .. | 14 15 1 |
| Salaries, | 127 0 0 | 213 15 0 | 220 0 4 | 328 4 0 | 322 6 6 | 314 7 6 | 1534 13 4 |
| Rent of Council Room, Taxes, etc., | 34 15 5 | 68 18 8 | 74 2 5 | 52 13 1 | 56 3 6 | 78 17 4 | 365 10 5 |
| Miscellaneous, including Wages to Office Porter, Messenger, Advertising, etc., | 158 9 1 | 167 5 6 | 144 18 6 | 94 11 10½ | 122 10 8 | 131 5 9 | 819 1 4½ |
| General Printing, | .. | .. | .. | 61 11 1 | 41 10 0 | 32 15 8 | 135 16 9 |
| Expenses connected with Lectures under Education Scheme, | .. | 38 1 1 | .. | 6 12 9 | 7 1 11 | 5 15 6 | 57 11 3 |
| Prizes connected with do., | .. | .. | 16 10 0 | .. | .. | .. | 16 10 0 |
| Expenses attending Meetings at a Distance, etc., | .. | 9 5 0 | .. | 18 18 9 | 3 10 0 | [now included under miscellaneous.] | 31 13 9 |
| Expenses connected with Emin Pacha Relief Expedition, | .. | .. | 22 0 1 | .. | .. | .. | 22 0 1 |
| Purchase of Scientific Instruments for Rankin Exploration Fund, | .. | .. | .. | 39 0 0 | .. | .. | 39 0 0 |
| Expenses of Removal to New Premises, | .. | .. | .. | .. | .. | 187 7 10 | 187 7 10 |
| | 1416 7 10 | 1175 15 1 | 1196 10 0 | 1404 17 1 | 1329 19 11 | 2143 19 11 | 8667 9 10 |

Funds at 31st October 1890 :—

| | | |
|---|---|---|
| £1000 Glasgow and South-Western Railway Company Funded Debt, cost, 29th May 1885, | | £1102 19 9 |
| Cash in Bank on Deposit Receipt, £100 ; in Accounts Currrent, £643, 13s. 3d., | £743 13 3 | |
| Add—Due by Honorary Treasurer £2, 6s. and by Secretary £9, 0s. 5d., | 11 6 5 | |
| | 754 19 8 | |
| | | 1857 19 5 |
| | | £10,525 9 3 |

*Edinburgh*, 15*th November* 1890.

Prepared by

J. M. MACANDREW, C.A.

### Meetings of the Society.

The Society held 15 Meetings during the Session,—7 in Edinburgh, 4 in Glasgow, 2 in Dundee, and 2 in Aberdeen.

The papers read at these Meetings were contributed by :—The Duke of Argyll, President of the Society, Sir Lewis Pelly, Dr. Thomas Muir, Mr. H. J. Mackinder, Colonel Mark S. Bell, Mr. Paul Du Chaillu, and Mr. H. M. Stanley.

### Educational Scheme.

In consequence of representations made by teachers and others, the Education Committee of the Council resolved to postpone the date of the Examination for the current year from June to the end of November. The day fixed for the Examination is Saturday, 29th November 1890. Mr. W. Jolly, H.M.I., and Dr. Hugh R. Mill have agreed to act as examiners.

### Scottish Geographical Magazine.

The Council, in approving of the manner in which the Magazine has been conducted, desires to express its recognition of the services of those who have contributed original articles and of the valuable aid accorded to the Editors by :—Mr. J. G. Bartholomew, Mr. J. T. Bealby, Mr. F. Bosse, Dr. James Burgess, Mr. Scott Dalgleish, Dr. Dods, Colonel Dods, Mr. John Geddie, Mr. John Gunn, Mr. J. W. M'Crindle, Dr. Hugh R. Mill, Mr. Ralph Richardson, Sir R. Murdoch Smith, Dr. George Smith, Mr. W. A. Taylor, Mr. Coutts Trotter, Mr. Dundas Walker.

### Library and Map Departments.

The following accessions were added to these departments during the past Session :—Books and pamphlets, 571 ; periodicals, 115 sets ; atlases, 22 ; and 329 separate sheets of maps. The books and maps are being arranged in the Society's Hall, and a catalogue is in preparation.

The Council desires to record its indebtedness to the donors of books, maps, and charts. The various foreign Governments with whom the Society has relations continue to send their official publications as issued. These publications form a most valuable medium of reference, especially in regard to statistical returns. Among private donors to the Society's library may be mentioned—Mrs. Fullarton, Dr. George Smith, W. B. Blaikie, Esq., Robert Young, Esq., and Coutts Trotter, Esq.

The increased accommodation for books, maps, and charts will enable the Library Committee to accept, with gratitude, any standard works that the Society may not already possess. In this respect the library is deficient, owing to its limited fund for purchasing volumes ; its chief value as a consulting library consists at present in current literature and the various colonial and foreign statistical publications that are received with regularity.

*For the Council,*

ARTHUR SILVA WHITE,
*Secretary.*

Edinburgh, 1*st November* 1890.

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